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AUTHOR Haring, Thomas G.; And Others
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ABSTRACT

The report documents the findings of a 3-year study of the social skill development of severely handicapped youth within integrated school and community settings. A series of seven studies were instituted on two central issues: (1) the ability to train and promote generalization of social language skills in the form of initiation and respondent behaviors directed toward nonhandicapped peers or counselors, and (2) the attitudes and resultant behaviors of nonhandicapped peers as a result of systematic contact experiences with handicapped individuals. The study focused on the following topics: teaching self-delivered reinforcement, differential reinforcement of other behavior within small group instruction settings, social interaction with autistic youth, social interaction during breaktime, between-class generalization, attitude change, and social language use. Findings suggested that teaching severely and moderately handicapped children to initiate and expand social interactions with peers and coworkers could influence the amount and type of interaction occurring in nontrained settings. Also revealed was that extended, one-to-one contact may improve subsequent behaviors and attitudes of nonhandicapped persons toward familiar handicapped peers. The bulk of the document is contained in Appendix C, which is composed of seven papers reporting the seven specific studies. The other two appendices consist of letters of support and agreement and data sheets. (CL)

Final Report

Grant No. G008104154

THE SOCIALIZATION RESEARCH PROJECT

Robert J. Gaylord-Ross, Project Director

San Francisco State University

Thomas G. Haring, Principal Investigator

University of California, Santa Barbara

Catherine Breen, Social Behavior Specialist

San Francisco State University

August, 1984

The research reported herein was performed persuant to a grant with the Special Education Program, U.S. Department of Education. Contractors undertaking such projects under Government sponsership are encouraged to express freely their professional judgement in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Special Education Program position or policy.

U.S. Department of Education

Special Education Program

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PROJECT OVERVIEW

Year	Number of New Staff Hired (part/full time)	Study Begun	Study Completed
1	4	Teaching Self-Delivered Rein.	Teaching Self-Delivered Rein.
		DRO within Small Group Instruction	DRO within Small Group Instruction
		Social Interaction with Autistic Youth	Social Interaction with Autistic Youth
2	4	Social Interaction during Breaktime	Social Interaction during Breaktime
		Between Class Generalization	Between Class Generalization
		Attitude Change	
		Social Language Use	
3	1		Attitude Change
			Social Language Use

Purpose and Objectives of the Project

The major purpose of the Socialization Research Project was to examine the social skill development of severely handicapped youth within integrated school and community settings. As the nexus of purported benefits derived from integrated educational settings is centered around the nature of social interactions between handicapped and nonhandicapped persons, the project was devoted to the investigation of social behavior between these two populations. Both secondary and elementary aged younsters were targeted in an attempt to teach normalized complex social behaviors to a wide range of individuals who were developmentally different from their nonhandicapped peers in terms of social and language development. The project was committed to the development of skills that would generalize to nontrained settings, persons, materials, and contexts. One method used to encourage generalized effects was to incorporate into the training package, activities and materials that were inherently reinforcing to both the severely handicapped and nonhandicapped persons. A second strategy used to investigate generalization effects was a multiple exemplar procedure, where more than one person and/or more than one example of a correct social initiation or response was used in training social behaviors. The project studies, additionally, focused on teaching social skills that past research has indicated will not emerge without intervention, utilizing procedures developed by and unique to the project.

Past research (e.g. Haring, 1978, Stokes, Baer, & Jackson, 1974) has supported training social behavior in severely handicapped individuals as brief interactions, e.g., a greeting response, or a simple 1-2 word response to another initiation; however, analysis of normal peer interactions indicates the presence of a more extended sequence of behavior including initiation, elaboration, and termination phases. In year 1 of the Socialization Research Project, initiation, elaboration, and termination responses were taught in series to severely handicapped/autistic teenagers to be used within leisure contexts with nonhandicapped peers. In year 2, similar procedures were used to teach extended interactions initiated by the severely handicapped high school students during break times from work in actual community job sites. During year 3 of the project, severe to moderately handicapped elementary school aged children were instructed to initiate social exchanges, and to expand upon initiations and topics formed by nonhandicapped peers within both leisure and work settings. The focus of this study was to teach the handicapped students to appropriately respond to and extend topics of interest to the nonhandicapped peers, and to initiate conversations which were inherently interesting to the nonhandicapped students.

For all three studies, the research focus targeted the control of differential treatment packages over the social behavior of the participants, and the generalization of trained behaviors in the presence of naturally occurring persons in a nontrained natural environment. For the first two studies, peers were used in training in order to more closely approximate the contingencies of the natural environment. In study 3, which targeted instruction with higher functioning participants, no peers were present during training so as to maintain the natural, untouched quality of the natural environment. Intervention in all 3 studies utilized the same materials and trained within the same settings as exposed to within the generalization contexts.

In addition to determining differential treatment effectiveness in a controlled single subject experimental study, the project during years 2 and 3 examined in a group design project, the effects of contact type and amount on the attitudes of nonhandicapped high school students toward handicapped persons. Attitudes were measured by use of a standardized questionairre completed by each student, a 15 min objective interview, and a 10 min candid behavioral measurement of nonhandicapped student initiated interactions with familiar and nonfamiliar severely handicapped peers. All measurements were taken pre and post intervention. Three types of contact over a 10 week period were investigated for the effects of such contact on attitudes and behavior of nonhandicapped teenagers toward handicapped persons.

Finally, in addition to the investigation of handicapped-nonhandicapped peer interactions, the project examined in year 1, the use of handicapped peers as reinforcing agents in instructional settings, and the use of the handicapped participant as his own agent of reinforcement in independent tasks.

Project Staff

The project staff was primarily recruited from staff and graduate students at San Francisco State University. The staff positions consisted of a project director, Dr. Robert Gaylord-Ross, principal investigator, Dr. Thomas Haring, social behavior specialist, Catherine Breen, a Marin County classroom teacher, Valerie Pitts-Conway, an Alameda County classroom teacher, Blair Roger, and a data collector, Melissa Haebler. The staff displayed a great deal of competence and committment in carrying out the project goals. No staff changes were made during the first year of operation.

During the second year of the project, the data collector, Melissa Haebler was replaced with a full time data collector, Mellanie Lee, who served in both sites for the remainder of the project. Two part time data collectors were added for use in the Marin County classroom: Michael Hall and Shephard Siegel. In addition a severely handicapped young adult, James Russell, and a nonhandicapped young adult, William Whitfield, were hired part time to assist in the completion of the two year contact-attitude investigation. James and William remained on staff for the remainder of the project.

During the third year of the project, Dr. Haring, Michael Hall, and Shephard Siegel left the staff. One data collector was added for use in the Marin County site, Katchka Kamen. As during the first year of operation, all staff showed competency and care in completion of project investigations during the final two years.

The project also supported one person in a secretarial capacity, Jackie Tomis, for the duration of the three year project.

Site and Subject Selection

The research was conducted on two educational sites. San Rafael High School is the location of a class for secondary autistic students. The teacher, Valerie Pitts-Conway, has worked closely with the project director and principal investigator in the past. She supervises a work experience course for regular education high school students. The students work with her autistic students on peer tutoring, social skill training, and friendship development. The second site is the Washington School of the Alameda School District. The teacher, Blair Roger, works with an intermediate class of moderately and severely retarded students. The class is in a regular education setting with numerous programmed contacts with nonhandicapped students.

The sites and students were selected based on the need of all of the attending severely handicapped students to receive systematic training of social skills, continuous access to and support from the regular education teachers and students, a need for social intervention at an intermediate and secondary level of education, and a desire to probe social research strategies across a range of severely handicapped individuals.

Operations and Procedures

Following the identification of school sites and subjects, the behavior specialist and data collector were assigned to the Marin County site to begin operations. Written permission was obtained from all parents and guardians. Individual students were selected to participate in one or two of the three studies to be completed the first year.

Year 1:

Study 1: A Procedure to Teach Students with Severe Handicaps to Self-Deliver Reinforcement.

Purpose: In experiment 1 of the self-reinforcement study, a multiple baseline across tasks design, counterbalanced for presentation of reinforcement type, was used to determine the effects of teacher-generated and student-determined reinforcement on the performance rate of 2 severely handicapped 18 and 21 year old males.

Procedures: In the baseline condition, the student was instructed to work. The number of units completed in a 10 min period was recorded. No reinforcers, prompts, or corrections were given. During the teacher-generated reinforcement phase, by consulting a VR-2 schedule, the teacher determined whether reinforcement would be given following performance at a predetermined criterion rate. During the student-determined reinforcement phase, by rolling a cube based on a VR-2 scedule, the student determined whether he was to acquire reinforcement following performance at a specific rate. The number of completed units following 10 min of work was recorded and displayed graphically. During both the teacher and student determined reinforcement phases, the cube was rolled after each session. Additionally, in both phases, data was taken to record the correlations between cube rolling and attentiveness, cube outcome and attentiveness, and cube contingency and attentiveness. Changes in attentiveness were interpreted as the student understanding the purpose of the cube. For both participants, the cube was additionally used to thin the schedule of reinforcement from VR-2 to VR-3, VR-4, VR-6, and no reinforcement.

Results: The results showed that student control over reinforcement was at least as effective as teacher control with both being superior in improving performance rate to baseline conditions. Both participants received higher attentiveness ratings following situations where the roll of the cube generated reinforcement. When the roll indicated no reinforcement, responses indicating positive affect, interest in the reinforcers, or interest in others were unlikely.

In experiment 2 of the same study, a reversal design (ABACAC) was used to test the same hypothesis with an 18 year old severely handicapped male. The same procedures were used. The results indicated similar results, with a steady improvement in performance rate across phases, the self-determined reinforcement strategy being equally successful in producing higher rates of responding as the teacher determined strategy, and greater attentiveness to the cube, reinforcers, and other people during positive outcomes of the cube roll when the roll served to generate reinforcement. For all three participants, no conclusions were able to be drawn regarding greater treatment effectiveness.

Study 2: Peer Mediated Differential Reinforcement of Other Behaviors in Instructional Settings.

Purpose: This study was designed to determine the effectiveness of a DRO treacment package on the aberrant behavior (vocalizations) of 3 autistic adolescents (ages 14-21) during a peer's instructional trial in a small group instructional setting.

Procedures: The behavior specialist began by measuring the percentage of time and/or percentage of trials during which the aberrant behavior occurred. The setting consisted of alternating instructional trials between the participant and a handicapped peer with each trial lasting approximately 30 sec. No intervention regarding prompts to be quiet or reinforcement for failure to emit targeted aberrant behavior was given to each participant for at least three consecutive sessions, and until stable baselines were found. Subsequently, a DRO plus extinction procedure was implemented, wherebye, each participant was immediately reinforced with 1 behavior token by a handicapped peer for each peer instructional trial when the participant failed to emit the targeted behavior, followed by delivery of a participant instructional trial where correct responding resulted in delivery of 1 skill token. An occurrence of vocalization during a peer trial resulted in the failure of the participant to receive reinforcement and the behavior specialist continuing to work with the peer until the occurrence of a peer trial when quiet behavior was seen. Each participant was required to collect 5 behavior tokens and 5 skill tokens in order to be excused from the instructional setting. Sufficient token accumulation was exchanged for 5 min of free time in the leisure area of the classroom. Again, intervention was continued until stable responding was found, at which point, intervention was withdrawn and a return to baseline condition was begun.

Results: The results showed that under baseline conditions, high levels of vocalizations occurred during peer trials in a small group instructional context. During intervention, the results indicated that the DRO procedure was effective in suppressing aberrant vocalizations across the three participants. For two participants, there was simultaneously a suppression of aberrant behavior and the learning of the instructional task.

Study 3: The Training and Generalization of Social Interaction Skills with Autistic Youth.

Purpose: In experiment one of this study, two autistic teenagers were taught to initiate and extend social interactions with nonhandicapped peers utilizing three age-appropriate and commonly used leisure objects.

Procedures-Experiment 1: The participants were first instructed in the use of the objects and subsequently instructed in the related social skills. The participants were exposed to a sequence of five experimental conditions to test for the effects of the presence of social materials, the presence of social materials in the possession of handicapped persons competent in the use of the materials, and the presence of social materials in the possession of handicapped persons competent in both material use and exchange of social pleasantries (eg, greeting, request to interact, orientation toward other during the interaction, and termination of interaction) in a leisure setting on the behavior of both nonhandicapped and handicapped persons. The five conditions were:

(1) No object baseline

(2) Object only baseline

(3) Object function training

(4) Social skill training

(5) Maintenance of treatment effects

Training with both participants utilized multiple peer trainers. Probes of generalization to nontrained others in a natural break environment were conducted throughout the study with probes for no object baseline interspersed throughout.

Results: The results indicated that for both participants, social skill training was necessary in order for substantial generalization of initiations to occur in the natural setting. For one participant, no responses were produced during no object baseline, 1 initiated response occurred during the object alone condition, 1 initiation occurred during the object function training phase, and 16 responses in the social skill training condition.

Additional measurements were taken during probe sessions. The total duration of interaction initiated by the severely handicapped participant in the leisure setting, and the familiarity of the nonhandicapped person toward whom the participant initiated were recorded within all phases of the experiment. For both participants, the greatest duration of interaction was found during the social training phase of the study. In the presence of two out of the three objects used, attempts to interact by the participants and longer durations of interaction were consistently seen during the social training phase. Finally, for both participants, there were significantly more attempts to initiate with familiar peers than with nonfamiliar peers.

Procedures-Experiment 2:In experiment two of the study, social skill training and object function training using 1 peer trainer were taught concurrently to one severely handicapped/autistic male. As in experiment 1, a multiple baseline across three objects design was used to demonstrate the functional control of the social skill training package over the participant's acquisition and generalization of the the social sequence.

Results: No initiations were present in the natural environment during baseline conditions. Once intervention was begun, generalized responding both with and without the objects was observed. The duration of the interactions was also substantial. The persons initiated toward tended to be familiar.

Year 2

Study 4: The Training and Generalization or Social Interaction during Breaktime at Two Job Sites in the Natural Environment.

Purpose: Four severely handicapped, autistic teenage males were used in this study to investigate the effects of a social training package utilizing one or more peer trainers on the generalized social behavior of these individuals toward actual coworkers during a 10 min break from work. Three of the participants had previously been exposed to a similar social skill training package within a school based leisure context (Study 3).

Procedures: A multiple baseline across participants design was used. During the baseline phase, the participants were given a cue to take a break and prompted to go to the breakroom. No further prompts, cues, or reinforcers were given for at least 5 consecutive sessions. The four participants were subsequently taught to initiate and sustain an interaction with coworkers surrounding the sharing of coffee or another beverage. The cumulative number of generalized initiations per phase was recorded. Additionally, anecdotal data was taken regarding the social willingness of the coworker to interact with the participants following an occurrence of an initiation, and was coded as active willingness, passive willingness, and active avoidance.

Results: The results of the study indicated that during baseline phases, none of the social behaviors occurred during either training or generalization probes. All participants, once intervention was begun were capable of accurately learning the social sequence within the training setting. Two of the participants required multiple trainers prior to the generalization of social behavior to the natural setting and time. One peer trainer was sufficient in order for two participants to begin generalizing social initiations. The cumulative number of generalized initiations for all participants was significantly greater than during baseline conditions. Social willingness indicated that 60% of the initiations made by the severely handicapped particiants were responded to with at least passive willingness to interact, which was defined as responding in a socially polite manner, but not extending the interaction. 28% of the initiations were followed by active willingness behaviors, and 10% were followed by active avoidance behaviors. All avoidance reactions occurred within one of the job sites and in response to initiations made by one of the participants.

Study 5: Training Between Class Generalization of Toy Play Behavior to Children with Severe and Moderate Handicaps

Purpose: This study describes a training program in which young children with severe and moderate handicaps were taught to generalize play responses to multiple sets of toys. A multiple probe design, replicated with four children was used to assess the effects of generalization training within four sets of toys on generalization to untrained toys from four other sets.

Procedures: The responses taught were unique for each set of toys. Baseline sessions were begun by the experimentor handing a toy to the participant and giving the instruction, "play with this". The participant was then given 15 sec to independently play with the toy. The training sessions began with the instruction, "play with this", followed by observation of whether or not the correct sequence of responses was produced. If within 10 sec, the responses were not made or made incorrectly, the instructor said, "No, do it like this" and modeled the correct sequence of behaviors associated with that particular toy. If the student correctly imitated the responses, the instructor said "good" and presented the next toy to be trained. If the participant did not correctly imitate the response, the instructor said "No, do it this way". The instructor then physically guided the responses by placing the participants hand on the toy and guiding the correct movement. No verbal praise or feedback followed manually guided responses. A multiple exemplar strategy was employed to promote generalization within the training sets (Stokes & Baer, 1977). Training began with instruction in the use of the most detailed toy in a response class. After the training criterion was met with that toy, the more abstract toys were trained one by one until generalization to the remaining untrained toys in the set occurred.

Results: The results indicated that training to generalize within two sets of toys was associated with stimulus generalization of other sets that did not formerly show generalization in three participants. While the participants generalized to between 50% and 100% of the toys that were similar in responses and effects they did not generalize to toys from the disimilar sets.

Study 6: The Effects of Peer Tutoring and Special Friend Experiences on Nonhandicapped Adolescents.

Purpose: Four experimental groups of 15, 15, 30, and 15 participants, respectively were used in investigating the effects of contact amount and contact type on the attitudes and behaviors of nonhandicapped teenagers toward handicapped persons, in general.

Procedures: The groups were categorized as (1) peer tutors: those students who were required to work for one 50 minute class period each day, in a formal, structured activity which required giving systematic cues, prompts and consequences, and recording data. All activities were taught to the peer tutors through teacher modeling and feedback and all activities were assigned by the teacher at the beginning of each class period. (2) special friends: those individuals who were required to spend four hours each week interacting with the students from the severely handicapped classroom in any manner chosen by the participant. The assignment of hours was flexible and arranged with the classroom teacher at the beginning of each week. The participant was allowed to use the free times before, during, and after school and on weekends to fulfill his/her time requirement. Suggested activities were posted in the classroom. No other instructions were given to the students, unless directly involving the safety of the handicapped students. The suggested activities were all of a leisure-recreational nature. No data or systematic teacher directed intervention was used during the interactions. (3) Volunteer-no contact control group: those individuals who expressed a desire to work in the classroom either as a peer tutor or as a special friend, but who were not allowed access to the students during the 10 week investigation. (4) Nonvolunteer-no contact control group: those individuals who indicated that they had no desire, even if time allowed to work in the special education classroom in any capacity.

The two contact groups received course credit for their work in the classroom. Assignment of the participants to one of the three volunteer-experimental groups was conducted randomly prior to the 10 week intervention phase. A pre/post experimental design was used to assess attitude and behavior change as a result of contact and contact type with the severely handicapped students.

Three measurement systems were used pre and post intervention. A 61 item questionnaire measuring four factors, knowledge about handicapped persons, amount of positive contact with handicapped persons, amount of social willingness to interact with handicapped persons, and general affect toward handicapped persons, was given to all participants. A 10-15 min interview which targeted the reasons for volunteering, in addition to the factors targeted in the questionnaire, was conducted with all participants in the three volunteer groups. Finally, a 5 minute behavior probe was conducted with all participants from the three volunteer groups which measured the type and duration of contact with a familiar and nonfamiliar handicapped person when placed in a setting where only the handicapped and nonhandicapped persons and data collector were present. All of the participants were blind as to the experimental questions. In addition, none of the participants were aware that they were being watched during the 5 min behavior probes.

Results: The results indicated that there was no significant difference between the contact groups on measures of attitude or behavior toward the handicapped pre or post intervention. There was a significant difference in the reasons for participation and continuing in the program post intervention between the two contact groups and the volunteer no contact group, although there was little difference in motivations to volunteer pre intervention. Additionally, there occurred significant differences in the type and duration of interaction with familiar and nonfamiliar handicapped persons as measured by behavior probes post intervention between the two contact grups and the volunteer no contact group, while the measures pre intervention showed similarity between groups. The questionnaire measurement indicated no differences pre or post intervention between the contact groups and the volunteer no contact group on any of the indicated factors. In fact, there was seen relatively no change in this measurement as a result of contact. The measurement proved to be insensitive to changes in attitude, as all volunteers scored very high on the measurement upon entrance into the program. There was a significant difference, however, between the volunteer group and the nonvolunteer no contact group on the factor of social willingness to interact, indicating a much higher desire among volunteers to interact with handicapped persons than among nonvolunteers.

Year 3

Study 7: Facilitating Pragmatic Aspects of Social Language Use with Moderately and Severely Handicapped Children.

Purpose: Three severely and moderately handicapped elementary aged students were trained to initiate social conversations and expand upon social conversations of others within a training context that closely simulated the natural contexts of dining in an elementary school lunchroom or working at a cafeteria job. The purpose of the study was to increase the range of conversational topics and appropriateness of topics produced by the students toward nonhandicapped peers.

Procedures: The training procedure consisted of prompts to initiate new topics of conversation, models of situationally appropriate topics, and models of expansions. Correct initiations and/or expansions were followed by an enthusiastic discussion of the topic by the trainer.

Generalization probes were taken in the natural context with the use of micro-tape recorders to record the conversational behaviors of the handicapped students with their nonhandicapped peers.

<u>Results</u>: The results indicated that the students increased their ability to initiate novel and appropriate conversations in the training and generalization settings. And the students were able to successfully expand upon a greater number of nonhandicapped topics of conversation in the natural setting as a result of training.

Summary

A three year research project investigating the social development of severely and moderately handicapped persons has been completed. The major studies of the project looked at two central issues, (1) the ability to train and promote generalization of social language skills in the form of initiation and respondent behaviors directed toward nonhandicapped peers or coworkers; and (2) the attitudes and resultant behaviors of nonhandicapped persons toward handicapped peers as a result of systematic contact experiences with handicapped individuals. The findings of three separate studies (studies 3, 4, and 7) indicated that by teaching severely and moderately handicapped children to initiate and expand social interactions with peers and coworkers, one could influence the type and amount of interaction occurring in leisure and work related nontrained settings. The three studies, additionally suggested that by arranging social interactions around a mutually enjoyable object, action, or topic of conversation, there will occur a greater likelihood that an interaction will be of extended duration and consisting of reciprocal exchanges of information.

A subcomponent of this first issue is teaching social skills through competency of social material use. One study directly targeted generalized play behavior around age appropriate toys as central to normal social development. This study found that systematic modeling and feedback of behavior using a multiple exemplar system of training was successful in producing generalized play movement responses with a series of detailed and abstract representations of selected toys. Study 3 as part of its training package investigated the effects of teaching the participants how to competently use three types of social materials on the subsequent interactions between handicapped and nonhandicapped high school students when the materials were present in a leisure setting. The results showed no increases of handicapped initiated responses in the leisure setting, an immediate interest and increase in nonhandicapped initiations toward the handicapped persons directly involving use of the social material, and a slow decrease of nonhandicapped initiations over time as the novelty of the material lessened. The study showed that in order for interactions to maintain or increase in frequency and duration, it was necessary to teach the handicapped persons to be competent both in material use and in relationship to purely social exchanges. The handicapped persons needed to be instructed to successfully initiate, sustain, and expand interactions.

Regarding the second central issue to the project, one study was completed which looked at the influence of contact on the behavior and attitudes of nonhandicapped persons. The study contrasted the notion that contact may result in negative reactions to handicapped persons by their nonhandicapped peers (Jones, 1972; Burton & Hirshoren, 1979). In fact, the study indicated that extended, 1-1 contact may serve to improve the subsequent behaviors and attitudes of many nonhandicapped persons toward familiar handicapped peers, in particular.

Finally, two papers were written that targeted systems to use when attempting to improve behavior in small group or independent settings. One investigation showed the success of a differential reinforcement of other behavior + extinction treatment package on the behavior of three autistic high school children in small group settings. The other investigation showed that students could be taught to independently self monitor their rate of behavior on independent tasks, and self deliver reinforcement according to thinner and thinner schedules of reinforcement.

In conclusion, perhaps the most important result of the three year project was that the participants were given access to multiple environments containing multiple nonhandicapped persons which had previously been unaccessible from the perspective of both the nonhandicapped and the handicapped persons involved. The handicapped persons were provided with some limited skills that would allow them entry into previously segregated situations, and they were viewed by their peers as competent beings for perhaps the first time in their lives. While the specific skills may not be maintained over the long term, the entry into these environments and the acceptance by their peers will continue as a lasting and a positive effect.

Dissemination of Findings

The findings and ideas generated from the project have been disseminated in a number of ways. Papers have been presented at professional meetings. Articles have been accepted or submitted for publication in a variety of professional journals. Also, two monographs with collections of individual papers were developed and provided to collegues and other educational service organizations.

In the remainder of this section there will be a listing of the various papers, speeches, etc. that have been completed during the three year project.

Publications

Breen, C., Haring, T., Pitts-Conway, V., & Gaylord-Ross, R., (1984). The training and generalization of social interaction during breaktime at two job sites in the natural environment. *The Journal for the Association of the Severely Handicapped*.

Haring, T.G. (1984). Training between class generalization of toy play behavior to children with severe and moderate handicaps. *The Journal of Applied Behavior Analysis*.

Gaylord-Ross, R.J., Haring, T.G., Breen, C., & Pitts-Conway, V., (1984). The training and generalization of social interaction skills with autistic youth. *The Journal of Applied Behavior Analysis*,

Articles in Preparation

Haring, T.G., Breen, C., Pitts-Conway, V., Lee, M., & Gaylord-Ross, R.G. The effects of peer tutoring and special friend experiences on nonhandicapped adolescents.

Haring, T.G., Breen, C., Pitts-Conway, V., & Gaylord-Ross, R.G. The effects of peer mediated differential reinforcement of other behaviors on the aberrant behaviors of secondary aged autistic students during small group instruction.

Haring, T.G., Breen, C., Pitts-Conway, V., & Gaylord-Ross, R.G. The effects of teacher-generated and self-generated reinforcement on the functional task performance of severely handicapped students.

Haring, T.G., Roger, B., Lee, M., Breen, C., & Gaylord-Ross, R.G. Facilitating pragmatic aspects of social language use with moderately and severely handicapped children.

Soft Publications

Gaylord-Ross, R., Haring, T., Breen, C., & Pitts-Conway (Eds), (1983). The social integration of autistic and severely handicapped students, Vol. 1, San Francisco State University.

Gaylord-Ross, R., Haring, T., Breen, C., Pitts-Conway, V., Roger, B., & Lee, M., (Eds.), (1984). The social integration of autistic and severely handicapped students, Vol. 2, San Francisco State University.

Presentations at Professional Meetings

Gaylord-Ross, R.G., Haring, T.G., Breen, C., & Pitts-Conway, V. Presentation at the conference for the California Association of Development Centers, Fallen Leaf Lake, CA, 1982.

Haring, T.G., Breen, C., & Roger, B. Presentation at the conference for the California affiliate of the Council for Exceptional Children, Monterrey, CA, 1982.

Haring, T.G., Pitts-Conway, V., Roger, B., & Gaylord-Ross, R.G. Presentation at the conference for the California affiliate of the Association for the Severely Handicapped, Monterrey, CA, 1983.

Gaylord-Ross, R.G., Haring, T.G., Pitts-Conway, V., & Roger, B. Presentation at the conference for the National Association for the Severely Handicapped, San Francisco, CA, 1983.

Haring, T.G., Pitts-Conway, V., & Roger, B. Presentation at the conference for the California affiliate of the Association for the Severely Handicapped, Sacramento, CA, 1984.

Haring, T.G. & Gaylord-Ross, R.G. Presentation at the national conference for the Council for Exceptional Children, Washington, D.C., 1984.

References

Burton, T.A. & Hirshoren, A. (1979). The education of severely and profoundly retarded children: Are we sacrificing the child to the concept? _Exceptional Children_, _45_, 598-602.

Haring, T.G. (1978). _The training and generalization of greeting response behaviors to severely emotionally disturbed pupils_. Unpublished Master's Thesis, University of Kansas.

Jones, R.L. (1972). Labels and stigma in special education. _Exceptional Children_, _38_, 553-564.

Stokes, T.R., Baer, D.M., & Jackson, R.L. (1974). Programming the generalization of a greeting response in four retarded children. _Journal of Applied Behavior Analysis_, _7_, 599-610.

Appendices

Appendix A: Letters of support and agreement

Appendix B: Data sheets

Appendix C: Manuscripts

Appendix A

Letters of Support and Agreement

Job Description: PROJECT DIRECTOR

The project director is responsible for the day-to-day operation of the research project. Job duties include supervision of social trainers and data analysts. This includes monitoring of all research activities at school sites as well as participating in experimental design processes. In addition, some hands on data collection and training will be done. The person will see that all research activities are implemented, write reports, articles, the project manual, and disseminate findings at professional meetings.

This position requires a strong background in applied behavior analysis. Qualifications are a Master's degree in Special Education or a related field plus at least three years experience working with severely handicapped persons. Further requirements include a background in statistical analysis, including time series analysis, experience in conducting small N research, and familiarity with current theories and research in socialization. This job will also entail the preparation of data for publication both with graphical analysis and computor programs.

This person must have a demonstrated ability to work cooperatively, both with research and classroom personnel. Affirmative action policies will be followed in selecting this person.

Job Description: SOCIAL BEHAVIOR SPECIALIST

The social behavior specialist will be involved with the hands on training of the students in the experiments designed for this project. The specialist will also engage in data collection, reliability checks and data analysis. Other responsibilities include orienting other persons to the goals of the project and dissemination of findings at meetings and inservice sessions.

This job entails driving to one of two or three school sites to conduct direct instruction and environmental inventories. The social behavior specialist will consult with project staff and teachers to better implement the studies and instruction within the classroom.

This position requires a strong background in precision teaching and a thorough understanding of behavioral technology in classroom instruction. The individual must have achieved at least a Bachelor's degree in Special Education or a related field and have at least two years experience in working with severely handicapped persons. A Master's degree and/or a teaching credential for Severely Handicapped is desirable, but not required. Affirmative action policies will be followed in selecting this person.

Job Description: DATA ANALYST/RESEARCH ASSISTANT

The data analyst will make systematic observations of social behaviors both at classroom sites and in the community. This person will participate in analyzing data throughout the project. In addition, some intervention and instructional skills will be required.

This is a half-time position for the calendar year. Qualifications are at least a Bachelor's degree, preferably in Special Education or a related field. This job also requires driving to school sites. Experience with severely handicapped students is desirable.

SOCIALIZATION
RESEARCH
PROJECT

San Francisco State University
Dept. of Special Education
1600 Holloway Ave.
San Francisco, CA. 94132
(415 469-1306

November 2, 1981

The San Francisco State Department of Special Education recently received federal funding to conduct a series of research and instructional projects in the area of socialization of severely handicapped students. The Socialization Research Project will begin operation sometime in January. We are currently seeking classroom sites in which to conduct our research into social training.

We have designed four studies that are ready for implementation:

Study One will train four secondary autistic youth to greet a variety of nonhandicapped and handicapped peers, by training them to pay attention to the eye contact patterns of those to be greeted.

Study Two involves the training of five autistic youth to participate in a variety of leisure activities. The subjects will be trained to initiate and sustain game interactions.

Study Three will train four severely handicapped autistic youth to reinforce other people in their environment when socially interacting by making eye contact, saying "uh-huh" and "yes", and smiling when appropriate. The idea behind study three is that social interaction with handicapped youth will happen more frequently if it is more socially reinforcing to the nonhandicapped peer.

Study Four is a longitudinal study which will measure the attitudes of thirty nonhandicapped students from sophomore and junior grades. The measurement of these students attitudes and behaviors toward the autistic students will be assessed as a function of their involvement in coursework designed to educate the nonhandicapped student in teaching methods and interaction skills with handicapped persons. All subjects in study four will be repeatedly measured over the period of a one and a half year time span.

In the first three studies, the training procedures to be used will not differ from those in regular use in a precision special education program. In fact, these studies will serve to expand the regular instructional program already in place without differing qualitatively from it.

We expect the autistic youth who participate in these studies to directly benefit. Participation should result in the acquisition of functional social skills. The addition of another highly trained instructor/researcher; hired by our project, can be expected to enhance the entire classroom by allowing proportionately more training time to all students. We anticipate that the projects trainer will stay in the classroom most of the school day. A percentage of the trainers time can be made available to conduct inservice training as needed. In addition to providing direct training and staff support, we will also report all findings to interested special education faculty in the district.

In summary, we anticipate many benefits to both school staff and students through participating in the Socialization Research Project. Since our program is completely instructionally oriented, we also expect the chances of liability to be extremely low. We are seeking the permission of the director of special education for the district, the permission of the school principle as well as that of the subjects parents. We have already received permission from the San Francisco State University Human Subjects Committee. Thank you for your support in operationalizing this nationally visible project.

Thomas Haring; Project Director.
Robert Gaylord-Ross; Principle Investigator.

MARIN COUNTY OFFICE OF EDUCATION

VIRGIL S. HOLLIS,
SUPERINTENDENT

BYRON W. MAUZY,
DEPUTY SUPERINTENDENT

Tom Haring, Project Director
San Francisco State University
Department of Special Education
1600 Holloway Avenue
San Francisco, Ca. 94132

Dear Dr. Haring:

This is to confirm our verbal commitment to cooperate and participate in the socialization research project to be carried out with severely handicapped students and non-handicapped peers at San Rafael High School.

We fully agree with the goals of the project; to determine the most effective way of teaching social interaction skills to severely handicapped students. The proposed studies on social skills teaching with autistic students and attitudes of non-handicapped students who work with the autistic students should provide valuable information to our instructional staff and to the University's teacher training program. We are appreciative of the opportunity to work with you on the implementation of this project.

Our only conditions pertaining to the socialization research project are, (1) signed parent permission will be obtained prior to the inclusion of any student in the project activities, and (2), all student records and project data and information shall be kept confidential.

We look forward to working with you in carrying out the goals and objectives of the socialization research project, and in utilizing the project results, which we feel will improve the instructional program for severely handicapped students.

Sincerely,

VIRGIL S. HOLLIS
Marin County Superintendent of Schools

E. Brennan

Edward Brennan
Assistant Superintendent

gs
cc: Valerie Pitts-Conway

1111 LAS GALLINAS AVENUE ○ SAN RAFAEL ○ CALIFORNIA ○ 94903 ○ PHONE (415) 472-4110

SOCIALIZATION
RESEARCH
PROJECT

San Francisco State University
Dept. of Special Education
1600 Holloway Ave.
San Francisco, CA. 94132
(415 469-1306

Dear Dr. Edward Brennan,

Thank-you for voicing support for the socialization research project, which has been funded through the Unitied States Office of Special Education. A letter giving your consent to conduct this research at San Rafael High School is needed at this point. I suggest that the letter appear on your letterhead and be structured along the following lines:

The Socialization Research Project and San Francisco State University is conducting a large scale research project to determine how to best teach severely handicapped students to socially interact with teachers, community members, and nonhandicapped peers. I have reviewed this project and support its' implementation at San Rafael High School.

The proposed research will include studies conducted with individual autistic students to teach social skills. In addition, the attitudes of nonhandicapped students, who will have volunteered to work with autistic students, will also be assessed within a group design. Finally, the project will do some limited video taping of training sessions to use in teacher training, for research reliability, and to identify training objectives from normal social interactions. Parent permission from all relevant students will be required before any efforts are undertaken.

All data and information pertaining to this project will be kept totally confidential; no subjects will be identified in any manner. The results will be used to develop improved instructional systems for severely handicapped classrooms, as such, any relevant information will be shared upon request.

Thank-you again for your participation and support. If you have any questions please donot hesitate to call Tom Haring at 469-1306 or Robert Gaylord-Ross at 469-1161.

Sincerely,

Tom Haring

Tom Haring
Project Director

Dear Parent,

The San Francisco State University Department of Special Education is conducting a study at Washington School to try to find social skills to teach to handicapped children. To do this we want to find out what normal students like to talk about and do when playing with their friends. From knowing what normal children do when socially interacting, we will know more about how to train handicapped and retarded students.

Since you know your own child best, you could be of great assistance to us by filling out the following brief form. Just fill it out and put it in the enclosed stamped envelop and drop it in the mail as soon as you are able to.

In addition, we would like to make several brief video tapes of handicapped students playing during recess. Since your child is likely to be playing along side or with the handicapped students we would like you to sign the attached consent form. To sign this form is completely voluntary.

Finally, we do plan to talk with students directly to ask them to tell us what kinds of things they like to do and what type of things they like to talk about with friends.

Thank you for your cooperation in this important project.

John Healy
Principal,
Washington School

Blair Roger
Teacher,
Washington School

Tom Haring
Project Director,
Socialization Research Project

(Feel free to say as much or as little as you like)

What does your child like to do best after school with friends?

1. ______________________________

2. ______________________________

3. ______________________________

What does your student talk most about during family meals?

1. ______________________________

2. ______________________________

3. ______________________________

What do you think are the topics or subjects that your child talks most about with his/her friends?

1. ______________________________

2. ______________________________

3. ______________________________

What are your child's favorite things to do in his/her free time?

1. ______________________________

2. ______________________________

Thank you for your help in returning this form.

SOCIALIZATION
RESEARCH
PROJECT

San Francisco State University
Department of Special Education
1600 Holloway Avenue
San Francisco, CA 94530
(415) 469-1161

Parent Permission Slip

Dear Parent:

The Department of Special Education at San Francisco State is carrying out a research project to find more effective ways of teaching social skills to severely handicapped students. We have received permission to carry out our study at School.

The study we would like your child to participate in is described on the attached page. I do not require access to your child's files, and her/his privacy will be protected by assigning a code initial for purposes of analyzing the data. Your child's name will not appear anywhere in the study and will remain completely anonymous in all reports.

Your child does not have to participate if you do not want him/her to. Even if you sign the permission letter, you can still decide later not to participate. I will be happy to share any information gained with you and your child's teacher for use in the classroom.

If you have any questions or concerns, feel free to call:

days : (415) 469-1306
(415) 525-7753

Sincerely,

Thomas Haring
Project Director
Socialization Research Project

TH:gb

I give my permission for ______________________________
to participate in the Social Research Project.

Signature : ______________________________

Date : ______________________________

SOCIALIZATION
RESEARCH
PROJECT

San Francisco State University
Department of Special Education
1600 Holloway Avenue
San Francisco, CA 94530
(415).469-1161

VIDEO TAPE CONSENT

The Socialization Research Project at San Francisco State University is currently undertaking a series of studies to identify ways of teaching severely handicapped students.to respond socially to others they interact with. To do so, we would like to video-tape your student interacting with volunteer, non-handicapped students as well as teachers.

The video-tapes produced will be used only for research purposes; to identify crucial social behaviors for instruction, and for teacher training. Your child will never be identified by his/her full name during the taping and his/her identify will remain completely confidential. The tapes will never be released for public viewing in any way. If you wish to give permission, which can be withdrawn at any time, please sign below.

I give my permission for ______________________________
(Student's name)

to be video-taped as part of the studies conducted by the Socialization Research Project.

Signature: ______________________________

Date: ______________________________

TH:gb

Socialization Research Project

San Francisco State University
Department of Special Education
1600 Holloway Avenue
San Francisco, CA 94530
(415) 469-1161

Social Approval Study

I am interested in seeing if severely handicapped students can be taught to smile, nod their heads or say words (or signs) of approval when other people socially interact with them. If this training is successful it is hoped that other students and people in general will approach and interact with the severely handicapped students more often. In addition, it is hoped that once these skills are taught, other people in the student's environment will form more positive attitudes towards the handicapped student.

The three students involved in the study will receive a daily 20-25 minute instructional session five days a week for several months. Either I or one other student from San Francisco State will carry out instruction and data collection, so that classroom personnel will not have to take time away from their other responsibilities. The instruction will occur on an individualized basis in the student's own classroom. Hopefully, those students who participate will all learn some useful social behaviors. The method of instruction used for this study will not differ from the methods used as a regular part of your students school day.

TH:gb

PLEASE READ!!!

HELP!!! We need any freshman, sophomore, junior, or senior to earn class credit for involvement in a special education work experience program. We have two programs to offer this year--a little something for everyone. Fun, exciting, and interesting work!!

READ ON!!!

Teacher's aid program:

You will be working in the autistic classroom one class period per day helping the students to learn to use money, to work at a real job site, to clean, to shop...

Requirements: You do not need to be an A student. You do not need to know how to teach. All we require is that you come every day and that you enjoy your work.

Special education independent study program:

Spend four hours per week at your leisure. Come in before school, during morning break, lunch, 6th period, after school, or weekends. The structure is loose. Hang out with one or two of the special students around school. Go to Sam's or to Pinky's... Play tennis, frizbee, softball... Take a peer shopping, bowling, to a movie, to play videogames, to Marriotts Great America, bicycle riding, or home for dinner. We're open to any idea as long as it's fun for both of you.

Requirements: 4 hour commitment per week. 1-2 hours of observation and discussion with the supervising teacher before you get started. All we require is that you are flexible and open to your own ideas.

GIVE US A TRY!!!

Anyone interested in either program or needing further details see your councilor or come talk to us: Valerie Pitts-Conway and Cathy Breen in_________.

WE NEED YOU!!

P.S. Anyone who might in any way be interested in enrolling in the program next semester, next year, or two years from now, please, let us know!

SOCIALIZATION RESEARCH PROJECT

San Francisco State University
Department of Special Education
1600 Holloway Avenue
San Francisco, CA 94530
(415) 469-1161

September 1982

To: Counselors/Teachers at San Rafael High School

The Socialization Research Project is a federally funded research grant devoted to investigating the social skill development of severely handicapped adolescents in integrated settings. One classroom which we have chosen to target is the autistic classroom at San Rafael High School taught by Valerie Pitts-Conway.

We are required over a course of three years to conduct four major research studies which deal with the social skill development of severely handicapped students. Our first endeavor was completed in June 1982. We investigated the effects of training social behaviors on the interaction patterns of three autistic students to spontaneously greet a nonhandicapped peer, make a conversational statement (what are you doing?), share a mututally desireable object, and terminatethe interaction. Additionally, we found that the total number of interactions between the handicapped and the nonhandicapped students increased at other times during the day as a result of training autistic students to emit social behaviors.

Our second major project which is set to begin within the first few weeks of the school year directly investigates the benefits to the nonhandicapped students of handicapped-nonhandicapped interactions. We will be looking at the nonhandicapped students' attitudes towards handicapped individuals, in general, before and after involvement in one of two programs requiring four hours per week spent in and/or out of the autistic classroom. We believe that direct contact with the special students will serve to improve the nonhandicapped students' attitudes toward the handicapped. Additionally, we would like to test whether the type of interaction one has with handicapped individuals is a determinant of degree of attitude change. The two programs to be offered over the following year and a half are the teacher's aid program and the special education independent study program. See the attached form for program description and requirements. We will need 8-10 students who have previously had no experience in the autistic classroom or in Bev Tanum's LH classroom for each program. We will also need to meet with 8-10 students who would be interested in enrolling in the program at some future date.

Any help that you can give us in recruiting students for this study would be greatly appreciated. The only information we would like to be passed on to the students are the program descriptions and requirements. The purpose of the study should remain completely confidential. Thankyou for your understanding of the importance and urgency of our endeavors at San Rafael High. Please ask all interested students to contact either Valerie Pitts-Conway or Cathy Breen in AR-104

Sincerely,

Cathy Breen

Cathy Breen
Project Trainer
Socialization Research Project

SOCIALIZATION RESEARCH PROJECT

San Francisco State University
Department of Special Education
1600 Holloway Avenue
San Francisco, CA 94530
(415) 469-1161

TO: Teachers and Counselors at San Rafael High   October 25, 1983

Thanks to your support the research carried out by the Socialization Research Project has been extremely successful. In our last year we are addressing nonhandicapped students' attitudes towards handicapped individuals. We are demonstrating that direct contact with handicapped students will serve to improve nonhandicapped students' attitudes toward the handicapped.

We have been looking at attitudinal change through interviews, questionaires and observation. In January we will conclude the study by going through this same process. It may be necessary to pull students out of their regular classes for approximately 10-15 minutes. If you forsee any problems with this please let us know. Attached is a list of students who will be involved in the study in January.

Please note that the purpose of this study must remain completely confidential.

Thank you once again for your support. Please let us know if you have any further questions.

Sincerely,

Mellanie Lee

Mellanie Lee
Project Trainer
Socialization Research Project

Valerie Pitts-Conway
Special Education Teacher
San Rafael High School

Appendix B

Data Sheets

DICE STUDY

Name____________________

Date____________________

VOCATIONAL

Phase__________

Frequency of aberrant________

Number assembled________

Rate________

Rate________

	Before
smile	
change in posture	
change in head orientation	

	After
outcome	
smile	
change in posture	
change in head orientation	

DOMESTIC

Phase__________

Frequency of aberrant________

Number assembled________

Rate________

Rate________

	Before
smile	
change in posture	
change in head orientation	

	After
outcome	
smile	
change in posture	
change in head orientation	

LEISURE

Phase__________

Frequency of aberrant________

Number assembled________

Rate________

Rate________

	Before
smile	
change in posture	
change in head orientation	

	After
outcome	
smile	
change in posture	
change in head orientation	

Dice Study

Name____________________

Date____________________

Setting____________ Phase____________

# completed			
Rate			

outcome			
smile			
chge body/ posture			
chge head orientation			

Setting____________ Phase____________

# completed			
Rate			

outcome			
smile			
chge body/ posture			
chge head orientation			

Setting____________ Phase____________

# completed			
Rate			

outcome			
smile			
chge body/ posture			
chge head orientation			

DROP replication

David K.

Date______

	+/-	time
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		

Total duration of peer trials: ______

Total duration of aberrant behavior: ______

% time aberrant behavior: ______

Date______

	+/-	time
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		

Total duration of peer trials: ______

Total duration of aberrant behavior: ______

% time aberrant behavior: ______

Date______

	+/-	time
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		

Total duration of peer trials: ______

Total duration of aberrant behavior: ______

% time aberrant behavior: ______

Date______

	+/-	time
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		

Total duration of peer trials: ______

Total duration of aberrant behavior: ______

% time aberrant behavior: ______

Date______

	+/-	time
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		

Total duration of peer trials: ______

Total duration of aberrant behavior: ______

% time aberrant behavior: ______

Date______

	+/-	time
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		

Total duration of peer trials: ______

Total duration of aberrant behavior: ______

% time aberrant behavior: ______

LEISURE EXCHANGE STUDY

Phase________ Name____________________

Date____________________

PROBE

									Freq.	%	Total
Initiations by SH											
Initiations by NH											
Length of interaction											

People interacted with:

Training Data

Response											Freq	%

Phase________ Name______________

Setting________ Date______________

								Total #/time
Initiations by SH								______
Initiations by NH								______
Length of interaction								______

1. NH name______________

Interaction type:

physical verbal
object food
positive negative

Notes:

2. NH name______________

Interaction type:

physical verbal
object food
positive negative

Notes:

3. NH name______________

Interaction type:

physical verbal
object food
positive negative

Notes:

4. NH name______________

Interaction type:

physical verbal
object food
positive negative

Notes:

5. NH name______________

Interaction type:

physical verbal
object food
positive negative

Notes:

6. NH name______________

Interaction type:

phsical verbal
object food
positive negative

Notes:

7. NH name______________

Interaction type:

physical verbal
object food
positive negative

8. NH name______________

Interaction type:

physical verbal
object food
positive negative

9. NH name______________

Interaction type:

physical verbal
object food
positive negative

Appendix A: Score Sheet for Training Sessions

Behavior	Date	Independent Performance	Prompt Level
S. leaves work area.			
S. pours a cup of coffee.			
S. adds 1 spoon/packet of sugar.			
S. adds 1 ounce of milk.			
S. takes coffee to table and sits down.			
S. asks familiar NH coworker/peer, "Hi, how are you?"			
S. asks NH "Would you like coffee?"			
S. pours a cup of coffee for NH.			
S. hands coffee to NH.			
S. responds appropriately to "What have you been doing at work?"			
S. responds to NH statement, "Take it easy"			
S. returns to work.			

Appendix B: Score Sheet for Generalization Probe

Behavior	Date	Independent Performance	Nature of NH response to SH initiation
Approach			
Greeting			
Offer beverage			

✓

+ = unprompted correct (-)

PARTICIPANT: Christian
DATE: Oct 11
PHASE OF STUDY: I
SESSION: 2

ORDER OF ITEMS	1	2	3	4	5	6	7	8	9	10
Spaceship	≡	≡	≡	≡	≡	≡	≡	≡	≡	≡
Frog										
Frog	3 —									
Airplane	5 —									
Animal	1 —									
People										
Boat	3 —									
Snake	3 —									
Motorcycle	2 —									

Piano

X s ≡ ≡ ≡ ≡ ≡ (dog)

Questionnaire

---Permission form

---Completely ananymous

---Establish rapport

---Define handicapped: mentally retarded to some degree, may be physically handicapped and retarded

1) Is anybody in your family retarded or physically impared?

Yes_____ No_____

If so:

a) What is their handicap?

b) Describe type of contact

c) How does it feel to spend time with them?

d) Get a description of an event opposite in affect of previous.

2) Have you seen a handicapped person within the last week other than students in this class?

a) What were they doing? you doing?

b) How did you react?

c) How did others react?

3) How many handicapped people have you seen within the last month other than students in this class?

a) 1 or 2 _____ 3 or 4 _____ 5 or more _____

b) What were they doing?

c) How did you and the other non-handicapped react?

4) Why did you volunteer for the Special Education class?

Do you know anyone else who has taken this class?

5) All of us have different sides to our personalities. In friendships with different people different sides of our personalities come out.

In your friendships with oters, rate the following personality traits for their importance. Rate as "most important, important, somewhat important, not very important, hardly ever important."

a) i) How important is it to be a boss or teacher figure with your non-handicapped friends?

Most important _____ Not very important _____
Important _____ Hardly ever imp. _____
Somewhat impor _____

ii) How important is ist to be a boss or teacher figure with your handicapped friends?

Most important _____ Not very important _____
Important _____ Hardly ever impor. _____
Somewhat impor _____

b) i) How important is it to be very similar to your non-handicapped friends in what you like?

Most important _____ Not very important _____
Important _____ Hardly ever impor _____
Somewhat impor _____

ii) How important is it to be very similar to your handicapped friends in what you like?

Most important _____ Not very important _____
Important _____ Hardly ever impor _____
Somewhat impor _____

c) i) How important is it to look very similar to your non-handicapped friends?

Most important _____ Not very important _____
Important _____ Hardly ever impor _____
Somewhat impor _____

ii) How important is it to look like your handicapped friends?

Most important _____ Not very important _____
Important _____ Hardly ever impor _____
Somewhat impor _____

d) i) How important is it to entertained by your non-handicapped friends?

Most important _____ Not very important _____
Important _____ Hardly ever impor _____
Somewhat impor _____

ii) How important is it to be entertained by your handicapped friends?

Most important _____ Not very important _____
Important _____ Hardly ever impor _____
Somewhat impor _____

e) i) How importnat is it to spend time with your non-handicapped friends even if you don't feel like it?

Most important _____ Not very important _____
Important _____ Hardly ever impor _____
Somewhat impor

6) a) What do you think will happen to these students after high school?

b) What do you think should happen to these students after high school?

Questionnaire (Form B)

1). Have you seen a handicapped person within the last week other than the students in this class?

a) What were they doing? you doing?

b) How did you react?

c) How did others react?

2) How many handicapped people have you seen within the last month other than the studnets in this class?

a) 1 or 2 _____ 3 or 4 _____ 5 or more _____

b) What were they doing?

c) How did you and the other non-handicapped react?

3) Why did you volunteer for the special education class?

During the semester why did you continue?

Will you continue next semester?

4) a) i) How important is it to be a boss or teacher figure with your non-handicapped friends?

Most important _____ Not very important _____
Important _____ Hardly ever important _____
Somewhat impor _____

ii) How important is it to be a boss or teacher figure with your handicapped friends?

Most important _____ Not very important _____
Important _____ Hardly ever impor _____
Somewhat impor _____

b) i) How important is it to be very similar to your non-handicapped friends in what you like?

Most important _____ Not very important _____
Important _____ Hardly ever impor _____
Somewhat impor _____

ii) How important is it to be very similar to your handicapped friends in what you like?

Most important _____ Not very important _____
Important _____ Hardly ever impor _____
Somewhat impor _____

c) i) How important is it to look very similar to your non-handicapped friends?

Most important _____ Not very Important _____
Important _____ Hardly ever impor _____
Somewhat impor _____

ii) How important is it to look very similar to your handicapped friends?

Most important _____ Not very important _____
Important _____ Hardly ever impor _____
Somewhat impor _____

d) i) How important is it to be entertained by your non-handicapped friends?

Most important _____ Not very important _____
Important _____ Hardly ever impor _____
Somewhat impor _____

ii) How important is it to be entertained by your handicapped friends?

Most important _____ Not very important _____
Important _____ Hardly ever impor _____
Somewhat impor _____

e) i) How important is it to spend time wtth your non-handicapped friends even if you don't feel like it?

Most important _____ Not very important _____
Important _____ Hardly ever impor _____
Somewhat impor _____

ii) How important is it to spend time with your handicapped friends even if you don't feel like it?

Most important _____ Not very important _____
Important _____ Hardly ever impor _____
Somewhat impor _____

6) a) What do you think will happen to these students after high school?

b) What should happen to these students after high school?

7) How did things go this semester?

8) What other activities, if any, (other than in the classroom) would you do with these students?

This is a questionnaire concerning your opinions, feelings and attitudes towards handicapped persons. Please do not leave any statement unmarked.

To answer these statements:

> Handicapped means any handicap including mental retardation, deafness, blindness, physically crippled, and emotionally disturbed.
>
> Retarded means people with lower intelligence along with a need to learn basic skills.

Remember that no one will know your name, so you can be completely honest.

1. What is your age? ________________

2. Are you (circle one) male? female?

3. Class level (circle one) freshman sophomore junior senior

4. What best fits your career interests (circle one)?

clerical	business	law	mechanic
art	medical	computers	teaching
construction	advertising	music	engineering
psychology	sales	sciences	homemaker
factory worker	truck driver	military	

other: ________________
fill in

On the next sheet, you will find a list of personality characteristics. We would like you to use those characteristics to describe yourself. That is, we would like you to indicate, on a scale from 1 to 7, how true of you these various characteristics are. Please do not leave any characteristic unmarked.

Example: SLY

Mark a 1 if it is <u>NEVER OR ALMOST NEVER TRUE</u> that you are sly.

Mark a 2 if it is <u>USUALLY NOT TRUE</u> that you are sly.

Mark a 3 if it is <u>SOMETIMES BUT INFREQUENTLY TRUE</u> that you are sly.

Mark a 4 if it is <u>OCCASIONALLY TRUE</u> that you are sly.

Mark a 5 if it is <u>OFTEN TRUE</u> that you are sly.

Mark a 6 if it is <u>USUALLY TRUE</u> that you are sly.

Mark a 7 if it is <u>ALWAYS OR ALMOST ALWAYS TRUE</u> that you are sly.

Thus, if you feel it is <u>sometimes but infrequently true</u> that you are "sly", <u>never or almost never true</u> that you are "malicious", <u>always or almost always true</u> that you are "irresponsible", and <u>often true</u> that you are "carefree", then you would rate these characteristics as follows:

Sly	3	Irresponsible	7
Malicious	1	Carefree	5

PLEASE DESCRIBE YOURSELF

Adaptable		Moody	
Conceited		Reliable	
Conscientious		Secretive	
Conventional		Sincere	
Friendly		Solemn	
Happy		Tactful	
Helpful		Truthful	
Inefficient		Unpredictable	
Jealous		Unsystematic	
Likeable		Wierd	

1	2	3	4	5	6	7
NEVER OR ALMOST NEVER TRUE	USUALLY NOT TRUE	SOMETIMES BUT INFREQUENTLY TRUE	OCCA-SIONALLY TRUE	OFTEN TRUE	USUALLY TRUE	ALWAYS OR ALMOST ALWAYS TRUE

Below are a list of characteristics. Please describe your group of friends on these characteristics. Circle the answer that best applies.

My friends do well in school.

Almost no one | A few | Almost everyone

My friends skip classes every so often.

Almost no one | A few | Almost everyone

My friends go to extra curricular events like plays, games, meetings, etc.

Almost no one | A few | Almost everyone

My friends get pretty wild when having a good time.

Almost no one | A few | Almost everyone

My friends have part time jobs.

Almost no one | A few | Almost everyone

My friends are active in school groups such as band, debate team or clubs.

Almost no one | A few | Almost everyone

My friends have gotten into behavior problems around school or have been suspended or kicked out.

Almost no one | A few | Almost everyone

My friends really come from lots of different groups around school.

Almost no one | A few | Almost everyone

I really don't have a very large group of friends that I hang out with.

Almost no one | A few | Almost everyone

I have a lot of friends who are my age but aren't in school.

Almost no one | A few | Almost everyone

My friends have gotten in trouble with the police.

no friends | 1 or 2 | 2 or more

Please indicate the answer that best fits your opinions for each statement.

1. People who are mentally retarded usually act crazy. yes___ no___

2. I would talk to a retarded person during a break at school.
   yes___ no___ unsure___

3. I avoid looking at or walking by crippled people when I see them on the street.
   hardly ever once in a while a lot

4. I have been a teaching assistant or volunteer in a special ed. class. yes___ no___

5. I have seen retarded people shopping at a store. yes___ no___

6. I have a handicapped brother or sister. yes___ no___

7. Retarded people will always act like little children. yes___ no___

8. I would stand next to a retarded student while I was talking to my friends.
   yes___ no___ unsure___

9. I feel afraid of handicapped or retarded people.
   hardly ever once in a while a lot

10. I would take a job in a place where retarded people work.
    yes___ no___ unsure___

11. I would like to be a teaching assistant in a special ed. class.
    yes___ no___ unsure___

12. I was scared by a retarded person who bothered me. yes___ no___

13. Someone in my family is handicapped. yes___ no___

14. Some retarded people get married. yes___ no___

15. I think that retarded students should accompany regular classes on field trips.

yes___ no___ unsure___

16. I just feel sorry for handicapped people.

hardly ever once in a while a lot

17. I have spoken with handicapped students during the last month.

hardly ever once in a while a lot

18. I have given money to a handicapped person on the street. yes___ no___

19. I have a neighbor who is handicapped. yes___ no___

20. Retarded people usually became that way from head injuries that occurred in accidents. yes___ no___

21. I would say hi to a retarded student if I knew who he was.

yes___ no___ unsure___

22. It can be rewarding for me to talk with or help retarded people.

hardly ever once in a while a lot

23. I would go to a movie with a retarded person.

yes___ no___ unsure___

24. During the last year, I have helped handicapped students who needed assistance.

hardly ever once in a while a lot

25. Handicapped people are better off being taken care of in some place like a nursing home, than they would be at home.

agree disagree unsure

26. I have seen t.v. shows about handicapped people. yes___ no___

27. Poor people are more likely to have chiluren who are severely handicapped.

yes___ no___

28. I would invite a retarded student to visit my home.

yes___ no___ unsure___

29. I think you can learn a lot about people in general by being with handicapped people.

yes___ no___ unsure___

30. I would sit next to a retarded person in class.

yes___ no___ unsure___

31. I have had an unpleasant experience with handicapped students; for example being yelled at or bothered during the past year.

hardly ever once in a while a lot

32. When I have seen a handicapped person needing help, I did what I could to help.

~~never~~ hardly ever once in a while

33. Handicapped people have a greater sex drive than normal people. yes___ no___

34. I would eat lunch with a retarued student.

yes___ no___ unsure___

35. It makes me feel a little sick being around people who are really handicapped or retarded.

hardly ever once in a while a lot

36. My parents have warned me to stay away from retarded people because they do wierd things. yes___ no___ unsure___

37. I would help a retarded person if he/she were in a class of mine.

yes___ no___ unsure___

38. I like having handicapped students attend our high school.

agree disagree unsure

39. I have seen handicapped people working at jobs.

never hardly ever once in a while

40. My parents spend time with handicapped people. yes___ no___

41. Retarded people are always happy. yes___ no___

42. I would invite a retarded student to eat dinner with my family.

yes___ no___ unsure___

43. I would go on a date with a retarded person.

yes___ no___ unsure___

44. I have seen handicapped students playing or doing things with other students at our school.

hardly ever once in a while a lot

45. I have seen a handicapped person on a public bus. yes___ no___

46. When the subject comes up, I have heard people in my family say <u>good</u> things about handicapped people. yes___ no___ unsure___

47. Retarded persons do not always end up in institutions. yes___ no___

48. I would take a retarded person out with me on a Friday or Saturday night when I was doing something with a group of friends.

yes___ no___ unsure___

49. I have had a class where a handicapped student also came in.

never hardly ever once in a while

50. Retardation is not contagious. yes___ no___

51. I would invite a retarded student to spend the weekend with my family.

yes___ no___ unsure___

52. When watching telethons about handicapped people, I have felt like giving money. yes___ no___ unsure___

53. I have seen handicapped students being ridiculed or made fun of by other students at our school.

never hardly ever once in a while

54. I have seen a retarded person at the beach or park.

hardly ever once in a while a lot

55. I think I know enough about how to help a handicapped person do something like find something in a store.

yes___ no___ unsure___

56. I would eat dinner with a retarded person who invited me to dinner in his home.

yes___ no___ unsure___

57. I have seen or heard about handicapped students at this school. yes___ no___

58. I have talked to a handicapped person around town.

hardly ever once in a while a lot

59. I would give a retarded student a ride home.

yes___ no___ unsure___

60. When the subject comes up, I have heard people in my family say <u>bad</u> things about handicapped people.

yes___ no___ unsure___

61. I would be friends with a retarded person.

yes___ no___ unsure___

Appendix C

Manuscripts

Facilitating Pragmatic Aspects of Social Language Use with Moderately and Severely Handicapped Children*

Thomas G. Haring

University of California, Santa Barbara

Blair Roger

Alameda Unified School District

Mellanie Lee, Catherine G. Breen, and Robert J. Gaylord-Ross

San Francisco State University, Dept. of Special Education

Running Head: Facilitating Social Language Use

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Abstract

Social communication training with students who experience severe handicaps has traditionally stressed the production of syntactically and grammatically correct statements. The purpose of the present study was to increase the range of conversational topics, and the appropriateness of topics produced by three students with severe or moderate handicaps. The participants were trained to initiate social conversations and expand upon the social conversations of others within a training context that closely simulated the natural settings of dining in an elementary school lunchroom or working at a cafeteria job. The training procedure consisted of prompts to initiate new topics of conversation, models of situationally appropriate topics and models of expansions. The correct initiation of novel conversations or appropriate and novel expansions was followed by an enthusiastic discussion of the topic by the trainer. Generalization probes were taken in the natural context with the use of microtape recorders to record the conversational behaviors of the handicapped students with their nonhandicapped peers. The results indicated that the students increased their ability to initiate novel and appropriate conversations in the training and generalization settings. The initiations produced in the generalization setting were analyzed to identify the effects of training on the number of different response classes used per session. Issues concerning valid classification of responses into response classes were discussed.

Facilitating Pragmatic Aspects of Social Language Use with Moderately and Severely Handicapped Children

Systematic studies of teaching expressive language to individuals with severe handicapping conditions have largely been concerned with syntatic or grammatic construction. Grammatical forms, i.e., noun pluralization, addition of suffixes, verb transformations, application of prepositional phrases and correct pronoun choice, have been taught using imitation, prompting and differential reinforcement strategies. The generative use of each form has typically been found following the application of a multiple exemplar approach to training (Stokes & Baer, 1977). That is, sufficient examples of each grammatical or syntatic form are presented and trained until the student applies the rule to nontrained members of the response class (Guess, Sailor, Rutherford & Baer, 1968; Baer & Guess, 1973; Clark & Sherman, 1975; Frish & Schumaker, 1974; Rubin & Stoltz, 1974). Guess, Sailor and Baer (1976) developed a language curriculum which extends the training of syntatical forms to contexts where those forms are functionally used. With the ultimate goal of grammatically correct sentences, structures are taught through imitation, correction and the reinforcement of responses which impact the student's immediate environment. Generative responding is produced by repeated exposure to the training stimuli in multiple natural environments. However, few procedures have been evaluated which encourage the spontaneous initiation of language.

More recent linguistic research minimizes the importance of training syntactical forms and emphasizes underlying semantic relationships (Sailor, Guess, Goetz, Schuler, Utley & Baldwin, 1980). Carr and Kologinsky (1983) demonstrated the acquisition of 10 singly produced signs in autistic children to be used spontaneously as requests for desired objects and actions. Thus, the production of a sign pragmatically served as a request for an object or action. The study emphasized training within incidental learning contexts (Hart & Risley, 1978, 1980) rather than under discrete trial conditions (Koegel, Russo & Rincover, 1977). The participants were taught to act as initiators by systematically reinforcing spontaneous productions of signed requests. As a result, greater spontaneous communication was found both during training sessions and in baseline-maintenance sessions. Incidental teaching has been used by many researchers to promote the generalization of language skills in severely handicapped students (Oiver & Halle, 1982; Schepis, Reid, Fitzgerald, Faw, Van Den Pol & Welty, 1982; McGee, Krantz, Mason & McClannahan, 1983).

The concept of "loose-training" as a facilitator of stimulus and response generalization is related to incidental training because training occurs in natural contexts with natural elliciting cues. Loose training refers to teaching and allowing multiple behaviors in response to one or more related stimuli. Campbell and Stremel-Campbell (1982) provide an example of stimulus generalization of trained language responses following exposure to a wide array of naturally occurring stimulus events which could appropriately signal trained responses. When social language occurs within well-known contexts, the actual accuracy and consistency of grammatical construction may be less crucial if both communicators understand the meaning of an exchange.

The language acquisition literature with severely handicapped children has stressed training for the purpose of satisfying critical needs or gaining desired actions or objects from the environment. Although the more purely social use of language has been of recent interest, few studies have focused on developing procedures to promote language-based social exchanges. Social language studies have paralleled those from the language acquisition literature, in that precise syntatic forms such as greeting responses (e.g., Gaylord-Ross, Haring, Breen & Pitts-Conway, 1984; Haring, 1978) have been stressed. Consequently, few procedures are available to promote the more pragmatic aspects of social communication within familiar, natural contexts (cf., Halliday, 1975). That is, procedures are needed to increase the use of a wider variety of communication functions in order to express a greater range of notions in social contexts. It is presently unknown whether an increase in the range of ideas communicated by a severely handicapped person would be functional in the sense that same-chronologically-aged, nonhandicapped peers would process and socially respond to pragmatically meaningful, but syntactically incorrect social/communicative utterances. When language use is considered in a social context, the reciprocal exchange of utterances is the central defining characteristic. Unfortunately, while the training of syntactically correct initiations has been demonstrated with severely handicapped learners, there are few examples of studies showing turn-taking, reciprocal exchanges or language exchanges beyond two or three semantically related utterances (Baldwin, 1983).

In the present research, social exchanges were taught to persons who already demonstrated considerable social communicative intent, but who had difficulty selecting appropriate topics for social exchanges within specific contexts. In this circumstance the participants showed a high degree of desire to interact with similar age peers. In fact, using the actual peers within the context to systematically train interaction might prove to be detrimental in terms of encouraging natural, untrained social conversation because peers may assume a teaching role with the handicapped students rather than a more equal peer relationship (Voeltz, 1982).

The purposes of the present study were: (1) to increase the variety of spontaneous social initiations of moderately and severely handicapped individuals in work and lunch settings; (2) to increase the students' ability to spontaneously expand upon social statements initiated by a nonhandicapped peer; and (3) to assess the effects of the training to increase the frequency of initiations and expansions of social conversation on the social behavior of nonhandicapped peers and coworkers.

Method

Participants

Three students from a class for severely handicapped students located on a public elementary school campus were selected to participate in this study. The three students were served in a school program based on a functional curriculum model that included community training or grocery shopping, money handling, restaurant skills and the use of public transportation. The involvement of peers in friendship-based leisure activities and vocational preparation within both the school and community environments were integral parts of the school program. Language instruction and social skill training were incorporated to the greatest extent possible in all facets of the curriculum.

Prior to the implementation of training, all participants showed either a relative absence or inappropriateness in their social conversation with adults and peers. While all students maintained a high level of receptive and expressive language capabilities (200+ word vocabularies, ability to follow 3-4 step mands given by familiar persons and 9-10 word sentence formation), to a great extent the skills were not used in contextually appropriate conversations. Finally, when nonhandicapped peers initiated a social exchange, the replies by the participants were either brief and unlikely to lead to subsequent interaction, or not appropriate to the conversational context that was introduced.

Mark was a 13-year-old male who was functioning ~~at the~~ moderate to severe range of mental retardation. While his articulation was difficult to understand, he was generally able to make himself understood by repeating statements. Observations by a trained observer prior to the study indicated that his initiations occurred at a high frequency but 80% of the initiations were inappropriate to the context, age inappropriate and repetitive of previously initiated statements. The timing of his verbal initiations often interfered with his and others' work activities. He would consistently greet familiar teachers and peers upon entering a setting; however, he would subsequently repeat greetings in the same setting to the same people. Mark would respond appropriately approximately 80% of the time to initiations made by familiar adults and 50% of the time to initiations made by familiar peers.

Ann was a 9-year-old, moderately handicapped girl with Down syndrome. Ann initiated greetings 100% of the time toward teachers and familiar adults, but did not greet peers in social and work related settings. Ann consistently responded to adult initiations, while her responses to peer initiations often consisted of giggling or unrelated conversation.

Kim, who was 14-years-old, was considered to be moderately handicapped. She would never initiate toward familiar or unfamiliar peers; however, she occasionally initiated brief interactions with familiar adults. Spontaneous and prompted verbal initiations and responses were often barely audible, resulting in others asking for repetition of utterances. Requests for repetition always resulted in Kim saying "I don't know." Kim never expressed greetings in work or social situations. She would respond appropriately to greetings from others approximately 30% of the time.

Table 1 provides an overview of psychometric evaluations conducted on each participant prior to the beginning of the investigation.

Insert Table 1 about here

The Nonhandicapped Coworkers consisted of a group of normal fifth graders who worked with the handicapped participants in the work and lunch environments. One to three coworkers (depending on the work setting) were present in the work environment and three to five coworkers sat at the table with a handicapped participant during lunch. All fifth graders were given an opportunity to participate at some time during the school year. Because the jobs were seen as a privilege and a means to leave class early, all fifth graders were interested in participating. New coworkers were randomly selected and trained every three weeks. The training of the fifth grade coworkers (which usually lasted less than 10 min) included suggestions of ways to prompt the handicapped workers if errors were produced on the task. No direct instruction was given regarding appropriate ways to socially interact with the handicapped participants, although approximately 75% of the fifth graders had some prior experience interacting with the handicapped students in the classroom, where strategies to socially interact wih the students during leisure activities had been discussed. In addition, the handicapped and nonhandicapped students frequently interacted at recess.

Trainers and Observers

The training of all three participants was conducted by one individual. The trainer was a recently trained, credentialled teacher of the severely handicapped who had had extensive experience in the use of behavioral training procedures and in conducting behavior analytic research. Four observers were used to score the reliability of coded data from tape recordings, and the accuracy of the written transcriptions of natural interactions. Two of the observe... were advanced Masters degree candidates in special education with extensive experience in the recording of behavioral measurements. One observer was an assistant professor in special education who also had extensive experience in behavioral measurement with handicapped individuals. The fourth observer, a certified public accountant, had no prior experience in the field of education. All observers were trained in the measurement techniques of this study prior to the recording of actual data. Three of the observers were blind to the experimental hypotheses and when treatment conditions were introduced.

Setting

The training occurred for all three participants in an elementary school cafeteria containing 40 lunch tables, a counter to distribute lunches and a window where cookies were sold. Each participant was trained at the lunch table where they normally ate with their nonhandicapped peers and at a work station (either the cookie window or the lunch counter). For Ann and Kim, training occurred in a 6 x 8 m room, which opened to the lunchroom through a window where cookies were sold to students and teachers. For Mark, training was conducted in the cafeteria at the head of the lunch line where hot lunches were dispersed. Mark was to stack empty metal trays to the left side of the lunch line, two m from the work environment of three different nonhandicapped coworkers.

During lunch, all of the nonhandicapped persons in close proximity were familiar to the participants. The nonhandicapped students were seated so that only one handicapped participant was seated at a table. Each table included the same coworkers who worked with the participants.

Procedure

Baseline and generalization probes. During baseline and training sessions the participants were given the cue "What do we talk about?" prior to entering the work setting. No further instructions, corrections or feedback were given. No observers or trainers were present and no intervention occurred during generalization probe sessions.

Initiation training. A social initiation was defined as any verbal behavior made by one individual which served to begin a purposeful interaction between two people and which led to an acknowledgement from the second party. One or two training sessions in each training setting were completed each day. Training was conducted 30 min before lunch or work on a daily basis. On three out of five days, an additional session was run in both settings either in the morning or in the afternoon. Thus, the participants were exposed to eight training sessions per week. The series of verbal statements indicated for each participant in Table 2 were taught in the following manner. The trainer stood or sat next to the participant, simulating the lunch and work activities of a nonhandicapped peer or coworker, i.e., eating a snack, passing out cookies, handing out lunches, taking money and waiting for students and staff. During simulations, the actual materials for that activity were used. For Mark, initiation training began with a discrimination trial regarding the presence or absence of customers or students, reflecting an appropriate or inappropriate time to initiate conversation with coworkers. A cue was given, such as "There is someone here to get his lunch." If the participant was silent the trainer praised the appropriate behavior. If the participant attempted to initiate a conversation with the trainer, the trainer corrected the behavior by explaining that while he was actually working he should not be chatting with the coworkers. A cue indicating the presence of people was given during 50% of the training trials. The cue "There is no one here" was presented during the remaining trials. In the presence of this cue, Mark was to initiate a conversation with either a trained statement or an appropriate social statement. If no ini iation was attempted, the trainer provided an additional cue "What do we talk about?". The cue "What do we talk about?" was given to Ann and Kim to initiate all training trials in both the lunch and work settings. All participants were allowed 15 sec to respond with either a trained statement that had not previously been given in the session or a novel statement appropriate to the context. If after 15 sec the participant had not produced a correct social statement, the trainer prompted a correct response by saying "Say (one of the indicated statements as given in Table 2)". The participant then modeled the correct response. Following a 30 . c delay during which work or eating was simulated, the trainer asked the participant "What else can we talk about?". The participant was required to either emit a different, yet trained response from the response given previously, or produce a novel statement appropriate to the context. The participant was allowed 15 sec to respond, at which time another contextually appropriate response was modeled. The procedure continued until at least three different social topics were discussed within any setting; or a maximum of six different social topics were discussed each session. If a student spontaneously produced a correct response (which included the production of trained statements not previously produced that session, or novel, appropriate statements) the trainer would enthusiastically discuss the topic with great interest, including asking the student additional questions about the topic. If a response had to be prompted, the trainer immediately continued training by asking "What else can we talk about?" without inclusion of an enthusiastic topic discussion. If the student attempted to initiate an interaction with a statement that had been previously given by the student or prompted by the trainer, the trainer said "Think of something new to say."

Insert Table 2 about here

Statements were treated as correct if they, in the judgment of the trainer, effectively communicated a comment or declaration which was situationally appropriate, regardless of the correctness of the grammar or articulation. The trained statements were selected based on two assessments of normal peer interactions. Initiations were chosen from a list of topic statements that had been gathered during interviews conducted individually with all fifth graders in the school. The interview assessed those conversational topics most favored and most frequently used by the fifth graders in natural social situations. Additionally, measurements were taken during baseline sessions of the present study assessing those topics most often initiated by nonhandicapped peer tutors in the lunch and work settings specifically. Sessions typically lasted 5-10 min.

Expansion training. An expansion was defined as a statement which could potentially serve to prolong an ongoing conversation by either providing or requesting new information regarding that conversation. This included questions, commands and declarative statements which had a high probability of extending an interaction past the point of the expansion. Questions which merely caused a person to repeat a statement were not considered expansions (e.g., "What?", "Huh?"). Statements which merely repeated sentences or sentence fragments of previously produced statements were not scored as expansions. Finally, statements that merely answered direct questions (e.g., yes or no) were not scored as expansions. Training times, setting simulation and reinforcement contingencies followed the same procedures as during initiation training.

During simulation of work or lunch activities, the trainer, posing as a nonhandicapped peer, emitted a social statement which was to serve as a cue for several possible expansions to be made by the handicapped participant. The initiations and expansion statements selected as stimuli for expansion training were selected following the same process described earlier. The statements were selected to include information which served to add or elicit new related information to the conversation. As an example, for Mark, the trainer would emit a statement often used by nonhandicapped fifth graders, "Did you see CHPs (a popular t.v. show) last night?". Mark was then given 15 sec to respond with one or two trained statements, "No, tell me what happened.", or "No, I rode my bike.", or with an untrained, yet appropriate statement. If no appropriate response was given, the trainer would prompt the correct behavior by saying,"Say (one of indicated responses given in Table 3)". As in initiation training, the participant was allowed to produce the same response only once in a session.

Repetition of a statement resulted in the trainer saying, "Think of something new to say." Each session continued until at least five expansion statements (to five different initiations) were rehearsed. From session to session, the order in which the statements were trained was changed so to discourage rote responding. In addition, the social statements given by the trainer were altered from session to session, such that the syntactical form changed while the meaning stayed the same, or communicated a closely related idea. Table 3 provides a description of the expansion statements trained to each of the participants in response to behaviors within given stimulus classes.

Insert Table 3 about here

Social validity probes. Four tapes collected in two settings during three phases of the present study were played to a group of 44 undergraduate liberal arts/social science majors. The tapes, each two min in length, contained a sample of the language and interactions that occurred in a work and a lunch environment. Samples were randomly selected from the following conditions: 1) baseline in the lunch setting, 2) initiation training in the lunch setting, 3) baseline in the work setting, and 4) expansion training in the work setting. The tapes were described to undergraduates in an introductory education class as language samples of one young man. The students were to listen to each of the four tapes and answer a series of questions. The tapes were presented to the students in a random order. The questions to be answered were: 1) is there a noticeable difference in the quality of interaction between tapes 1 and 2, and between tapes 3 and 4; 2) in which sample did the person express a greater range of topics; and 3) in which tape does the person seem most competent in social situations.

Experimental Design

For Mark, a multiple baseline across responses (initiations and expansion) design was employed. For Kim and Ann, a multiple-baseline across participants and responses design was used to demonstrate the functional control of the training intervention over: (1) the number of spontaneous initiations of trained and nontrained social statements made toward nonhandicapped peers and/or coworkers during natural lunch and work periods; and (2) the number of expanded statements produced, based on conversational statements made by nonhandicapped persons toward handicapped peers. Baseline probes were taken in both the generalization and training settings until stability in performance was demonstrated in each, at which point initiation training was begun with the first participant. Intervention with the second participant was lagged in as functional control of the intervention over the previous participant's social behavior was determined. After both participants showed changes in initiation reponses, the intervention procedure was sequentially applied to expansion responses.

Measurement

In the generalization settings each participant carried a microcassette tape recorder (2 x 6 x 10 cm) placed inconspicuously in the breast pocket of his/her shirt. Tape recordings were made for 20 min during baseline and intervention sessions. The recordings were transcribed and coded by the trainer and trained data collector. Each verbal statement was coded as one of the following: NIH--nonhandicapped initiation toward handicapped, HIN--handicapped initiation toward nonhandicapped, HIA--handicapped initiation toward adult, NEH--nonhandicapped expansion of a statement produced by a handicapped person, HEN--handicapped expansion on a statement made by a nonhandicapped peer, HEA--handicapped expansion of an adult's statement. In addition, inappropriate vocalizations were coded and not included as initiations, responses or expansions.

Initiations produced by the handicapped students were analyzed by assigning each initiation to a broader response class which defined the purpose of the initiation. Table 4 presents an overview of the generation of response classes.

Insert Table 4 about here

The process of categorization of initiations into response classes first involved classification based on the function of the statement into one of five broad categories:

Comments were defined as statements concerning some attribute of an event which served to give information about the event to the other person.

Questions were defined as statements concerning an event which served to gain information from the other person.

Requests/Mands were defined as statements produced as a means to achieve behavioral compliance, or as a means to gain access to an object.

Greetings were defined as social statements given when a person first enters a setting.

Terminations were defined as statements (such as "Bye") which serve to end an interaction.

Once a statement was classified according to function, it was further classified as to the nature of the grammatical subject of the statement. The grammatical subject was defined as the receiver or doer of an action, or an object that is described or identified. Specifically, statements were categorized as concerning oneself, another person, food or an object.

Statements were also classified on the basis of the context or the nature of the event communicated. The description of the nature of the event included whether the statements concerned action, location, the time of day, feelings, hunger, possession or description of an object's or event's characteristics.

Finally, the statements were further categorized as to when the event occurred. The timing of events being communicated was categorized as occurring in the past, present or future. To illustrate the system for constructing response classes, the statement "What are you doing after school?" would be classified in the response class titled, Question about Others Future Action. Further examples of response classes wth actual statements from the present investigation are given in Table 5.

Insert Table 5 about here

For each session, the frequency of different response classes produced was calculated and graphed. For each session, frequency counts of the number of response classes were made, and only those response classes which were new for the session were used to determine the frequency for that day. In addition, a lexicon of each participant's initiations were kept for the entire study. By doing so, the frequency of new response classes produced for the study was determined and graphed for each session.

Changes in occurrence of expansion statements produced by the handicapped participants were analyzed by determining for each session the number of expansion statements which directly followed a nonhandicapped initiation, and in turn were followed by a response or another expansion statement made by a nonhandicapped person. The percentage of HENs emitted in relationship to the number of opportunities for expansion was calculated using the formula:

$$\frac{\#HEN}{\#NIH} \times 100$$

Success in discriminating appropriate times to initiate conversation was recorded for Mark as +/- and calculated as percent correct responding. Spontaneous production of a trained initiation, an expansion statement or the production of a novel appropriate statement was scored as +; no response, a repeated response or a prompted response was scored as -. The percentage of spontaneously produced initiations and expansions was charted using the formula:

$$\frac{\#\text{ of spontaneously produced statements}}{\text{Total }\#\text{ of opportunities to produce statements}} \times 100$$

Interrater Reliability

Reliability measurements were taken for each participant on 30-83% of the generalization data in baseline and training phases.

Four observers scored each transcribed social statement as one of the defined coded descriptors (including all but work-related conversation). Point by point agreement (Kazdin,, 1982) was assessed and the percentage of agreement between the trainer and observer was determined using the formula:

$$\frac{\#\text{ of agree} - \#\text{ of disagree}}{\text{Total}} \times 100$$

For Ann, there was found to be 97.3% agreement for 50% of all baseline sessions, and 96% agreement on 83% of the generalization sessions taken during the initiation training phase. A 99% agreement was found on 50% of Kim's baseline sessions, and 100% agreement on 56% of her sessions recorded during the initiation training phase. Reliability data for Mark indicated 90% agreement on 42% of baseline sessions, 95% agreement on 30% of the sessions from the initiation training phase, and 96% agreement on 30% of the generalization sessions recorded during the expansion training phase.

The reliability of the training data was assessed utilizing an independent observer. Both the trainer and observer scored each spontaneously produced initiation and expansion as to correctness. Point by point reliability was calculated for 22% of the training sessions. The reliability ranged from 84% to 100% with a median of 100%.

Results

Training

Figure 1 displays the training data for Mark. The baseline measurements for the discrimination training indicate that Mark correctly discriminated the presence or absence of students (indicating the appropriate times to converse) 0% of the time. Once discrimination training was begun, appropriate responding increased to 45% of the given trials, and increased to 100% correct responding by the seventh session of training. Perfect discrimination was maintained for the following four days at which time discrimination training was discontinued.

Insert Figure 1 about here

The baselines for both initiation and expansion responses show that no correct responses were produced toward the trainer within the simulated work and lunch sessions. In fact, under both conditions, Mark did not respond to any of the experimental cues given by the trainer. When initiation training was introduced, correct responses were produced on 40% of the occasions which were structured to cue responding. During the last six sessions of initiation training, Mark was averaging 74% correct responding. After Mark's initiation training data had stabilized, expansion training was introduced. On the eleventh day of expansion training Mark responded correctly every time the trainer initiated a conversation.

The training data for Ann and Kim are given in Figure 2. The baselines for both Ann and Kim indicate that no correct responses were made toward the trainer in either the work or lunch settings. For Ann, once initiation training was begun, she initiated 17% of the time, and steadily increased her percentage of correct responding until she was initiating following over 70% of the trainer's cues during the last three training sessions. For Kim, correct responding increased to 44% immediately following the introduction of intervention. Her initiations fluctuated around 80% correct for the remainder of intervention with a range between 70 and 100%.

Insert Figure 2 about here

Generalization

Figure 3 shows the initiation data for Mark expressed as the number of different response classes produced each session. The baseline data show that performance fluctuated around a mean of 4.74 different response classes per session. However, as many as 8 different response classes were produced during a baseline session, and as few as 3 were produced during four baseline sessions. When training was introduced in the simulated context, the generalization data showed an immediate increase to 10 different response classes. Figure 3 shows that a mean of 8.23 different initiations per session were produced during initiation training. In terms of overall frequency of initiation, which is not indicated in Figure 3, Mark's data rose from an average of 7.7 per day to an average of 14.2 initiations per day.

Insert Figure 3 about here

Figure 3 also shows the generalization data for Mark's expansions. The expansion data is expressed as percentage of times Mark produced a correct expansion after a coworker had initiated an interaction. The baseline data show a fluctuation around a mean of 10% correct expansions; however, during two sessions Mark correctly expanded upon 29% of the nonhandicapped coworker's initiations. The baseline data also show that on 11 occasions Mark did not produce any situationally appropriate expansions. When expansion training was introduced, Mark's generalization data did not show an appreciable increase from baseline levels until the eighth day of training. Although the mean level of correct expanding rose to only 23% overall during expansion training, by the last five sessions, Mark was correctly expanding upon an average of 45% of the nonhandicapped peer's statements.

Figure 4 shows the generalization data for Ann and Kim. Kim's data shows that she did not initiate a social interaction with a nonhandicapped peer until the 17th session of baseline. Of the two initiations she produced during baseline, one was a request for help ("open it") and the other was a comment about a fallen cookie ("it fell down"). When initiation training was begun, Kim gradually initiated more interactions during the generalization sessions. Although her mean number of initiations was 3.56 during the entire phase, the mean for the last five days was 5.6 new initiations per day. What is not indicated in Figure 4 is that her frequency of initiation (i.e., counting all initiations, not just new initiations per session) also increased substantially from baseline levels: from a mean of .09 to 5.3 initiations per day. In terms of the diversity of Kim's initiations, on an average day she initiated 5.3 interactions, 3.56 of which were not repeats of other response classes already produced that day.

Insert Figure 4 about here

Ann's data (Figure 4) shows a mean of .76 different response classes per day during baseline and a mean of 9 per day during initiation training. In terms of raw frequencies of initiations, Ann produced a mean of 1.3 per day during baseline, and 15 per day during initiation training.

<u>Novelty of Generalized Initiations</u>

The initiation data from the three participants was further analyzed to determine if the training procedure increased the number of new response classes being produced. The number of new response classes each session for Mark is presented in Figure 5. These data were produced by keeping a lexicon of each initiation produced during the study and categorizing each initiation into response classes. Initially during the baseline sessions, many of Mark's initiations counted as new response classes simply because it was the first time a response from the class had been produced. However, once a response class was represented, further responses from that class were not included in these data. Thus, it becomes progressively rarer for a response to be from a new (for the study) response class. By the end of the baseline condition, Mark was usually producing either no or just one new response class per session. When the initiation training was begun, a slight increase in the number of new response classes per day was observed; however, by the end of initiation training, the number of new response classes per day had returned to baseline levels.

Insert Figure 5 about here

Comparable data for Kim and Ann are presented in Figure 6. For Kim, the introduction of initiation training resulted in a sizeable increase in the number of new response classes per session. Ann's data indicates that the introduction of the initiation training resulted in a rapid increase in the number of new responses classes used, but, as with Mark's data, the number of new classes produced per session had returned to baseline level by the end of the training.

Insert Figure 6 about here

These data indicate that the effects of the training was to infuse new response classes at a higher rate than baseline into the conversations. Although the rate of introducing new response classes had returned to baseline level, the new response classes which were introduced during the initiation training continued to be produced during other sessions throughout the study. This is reflected in the generalization data reported earlier (Figures 3 and 4), in that the diversity in initiations (i.e., the number of different initiations per session) produced by the handicapped students continued at a fairly constant level throughout the study. To summarize, the initial effects of initiation training included an increase in the rate of introduction of new response classes into the conversations. After this initial increase, the number per day of novel response classes for all three participants showed a trend toward returning to the baseline level of introduction of new statements. It is interesting, however, that these new response classes, which were first produced during initiation training, continued to be produced during subsequent sessions, which is reflected by the increased number of response classes produced per day throughout the intervention phase.

Social Validity of Conversation

Tape recordings of sampled social exchanges were played to 44 undergraduates in an introductory education course. In comparing the overall quality of interaction between tapes from baseline conditions to tapes from intervention conditions for Mark, 42 students indicated that the tape from the initiation phase during lunch was superior to the tape from the baseline session during lunch. In comparing baseline data to expansion data during the work context, 38 students indicated that the tape during the expansion training was of a higher quality of interaction. In judging which tape contained a greater range of topics, 42 indicated that the tape during initiation training was superior to the baseline tape in the same context, and 37 indicated that the expansion tape was superior to the baseline tape in the work context. Finally, all of the respondents indicated that Mark sounded more socially competent during the initiation training phase tape than he did during baseline in the lunch context and 43 indicated he sounded more socially competent on the tape made during the expansion training phase than he did during the baseline tape.

Discussion

Mark, Ann and Kim successfully acquired the initiation responses which were directly taught. Within the training and generalization sessions the procedure produced untrained initiations across all three participants. Interestingly, when the participants started to produce novel initiations in training, their first attempts at novel initiations were often closely related to the previously trained statements. For example, Mark was trained to say "What are you doing in class?" and modified this to say "What are you doing at recess?". The unique aspect of the training procedure in the present study was the use of a loose training paradigm where there was variation in cues from trial to trial as well as variation in acceptable responses. It should be pointed out that the content that was actually trained was a small set of social stimulus and response classes. The effect of organizing training along this conceptual framework was tested with the generalization data. In the present case, the procedure resulted in considerable generalization within natural work and dining settings. The data indicated that the procedure produced greater diversity in the social conversations of the participants. A short-term effect of the training was to increase the level at which new initiation response classes were produced by the students. Although the level of introducing new response classes returned to baseline levels, the diversity of interactions remained higher than baseline levels throughout the study.

This is a preliminary progress report of a study that is still underway. As such, several sets of data are not yet complete. These include the expansion training and generalization data for Kim and Ann. In addition, we have collected considerable social validity data that is still undergoing analysis.

The generalization data for Mark's expansions indicates that by the end of the study he was expanding upon 45% of the nonhandicapped peers' initiations. To judge these data it would be important to know what percentage of statements that nonhandicapped peers typically expand upon. Although we suspect that Mark's data will show that his level of expansions is appropriate (judging from our subjective impressions after listening to the tapes, and also based on the responses of the undergraduate students), we have collected an additional set of data on the naturally occurring social interactions between nonhandicapped students in identical situations. This data is still being analyzed, but it could potentially provide an important confirmation of the social significance of these data by giving norms by which to judge these data.

Several issues are raised when transcriptions of social interactions are taken and categorical systems are developed to classify social and communication data. Foremost of these issues is that categorical systems inherently impose some theory of interaction on the data (Newson, 1977; Ochs, 1979). This brings to light two issues in regard to the present data. First, the categorical system developed in this study represents the researchers' interpretation of the meaning that the students are trying to communicate. Even if the nonhandicapped students respond to these utterances in ways which essentially correlate with our categorical system, there is no confirmatory evidence that this is, in fact, what was meant by the initiator. In relation to this point, our own data could be further analyzed for instances of attempts to use another statement to more clearly communicate the intended notion when the handicapped person discriminated that the nonhandicapped person did not understand the statement as it was intended. We have not done this. In any case, the frequency of such attempts to "repair" the interaction may be only a fraction of those interactions which were not interpreted correctly as to the intent of the initiator. In summary, the essential point is that although our system assigns certain meanings to statements (even though peers respond in similar ways to our system) this does not mean that the communication was sent by the handicapped student to purposefully communicate a given statement as we have it classified.

A second and related point is that our categorical system imposes, to some extent, a theoretical view onto the data. We have purposely kept the degree of such "theoretical influence" low. Our system was designed to keep the degree of theoretical inference low by dealing with basically discrete properties. For example, one category developed was 'question about others future action' ("What are you going to do at recess"). We could achieve reasonably high reliability in constructing response classes since observers could readily agree about such properties of the utterance as future time, that it was a question to gain information, and that it was a question regarding another's action. On the other hand, it could be argued that this statement was really serving as an initiation to communicate something like, "I would like to play with you at recess". Such counter arguments could be made (at the expense of high reliability) at numerous points in the transcripts. To summarize, the level of inference that we made about what the student was trying to communicate was kept low. This may reflect a bias on our part toward reliability at the expense of "truth". It may also reflect an adult imposition of meaning onto children's utterances. In any case, it is hoped that reporting such potential influences on our interpretation of these data will serve to better define the frame of reference with which to view these data.

The goal of the study was to increase the social communicative competence of the participants by promoting increased motivation to think of new initiations that are appropriate to particular contexts and to expand upon the statements of others. The training functioned to increase the student's ability to discriminate contextually appropriate initiations. To speculate a bit, organizing the training into stimulus and response classes may have facilitated this process. This possible facilitation could have occurred because the student was reinforced either for responding to the topic at hand or saying a new but related topic rather than trying to produce syntatically or phonologically correct statements. The organization of training into response classes may have directly or indirectly facilitated this because thinking of new or related responses was reinforced while rotely repeating previously heard or produced statements was not. The utility of teaching social responses in more traditional, massed trial formats, is an empirical question that future investigations can contrast with more dynamic training models.

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Table 1

Psychometric Evaluations for Three Participants

As Indicated by Mental Age Equivalencies

Test Name	Mark	Ann	Kim
Stanford-Binet	NA*	4.25 yrs	NA
Denver Developmental Screening	NA	3.5-4.5 yrs	NA
Peabody-Pic Vocabulary	NA	6.2 yrs	6.6 yrs

*NA = not available

Table 2

Initiation Statements Trained to Three Participants

Participant	Context	Initiation
Mark	Work	What are we having for lunch?
	Work	What are you doing in class?
	Lunch	How old are you?
	Lunch	What are you doing after school?
	Lunch	Do you like this food?
	Lunch	Do you like CHPs (tv show)?
Ann	Work	Hi, how you doing?
	Work	The cookies look good today.
	Lunch	What's for lunch today?
	Lunch	Do you want to trade?
	Lunch	What are you doing at recess?
Kim	Work	Hi, how are you?
	Work	What kind of cookies are we having today?
	Work	What are you doing after school?
	Work	Do you have any brothers or sisters?
	Lunch	I'm having (name of food) today.
	Lunch	Did you watch t.v.?
	Lu ch	Goodbye.

Table 3

Train Participants to Expand upon Statements Made by Nonhandicapped Peers

Participant	Context	Stimulus Class	Expansion
Mark	Work	Pick that up, pick that up. Come on, stop it. Get ready.	Hold on, I'll do it. Don't worry, don't worry.
	Work	Hurry up-take it. -do it. -come on.	Wait a second, don't panic. Be patient.
	Work/Lunch	How ya doing?	Great, how are you? Alright, how you doing?
	Work/Lunch	Hi! Hello Hey!	How you doing? What's up? What's going on?
	Lunch	Did you see (tv show) last night? Did you watch t.v.?	No, tell me what happened. No, I rode my bike.
	Lunch	Hey, do you want this?	How about a trade? Do you hate it?
Ann	Work	There's people in line. I think we have company.	Are you ready? Do you think it'll be busy?
	Work	Hi! Hello	Hi, what's new? Hi, how was lunch?
	Lunch	Do you want some? Do you want this? Do you want it? Who wants this?	Yeah, I'll give you (food) for it. No, do you have anything else?
	Lunch	Are you going to clean up? Aren't you done?!	Will you help? Has the bell rung?

Table 4

Strategy to Code Initiation Response Classes

Function of the Statement	Nature of the Grammatical Subject	Context	Time
Comment	Self	Action	Past
Question	Other	Location	Present
Request/Mand	Food	Time	Future
Greeting	Object	Feeling	
Termination		Hunger	
		Possession	
		Description	

Table 5

Examples of Response Classes

Request/other/action/present

Look, look.

Eat it, eat it.

Will you help me?

Let me have it.

Here, put over here.

Will you throw this away.

Hurry up.

Greetings

Hi.

Hello.

Hey buddy.

Hey.

Hey man, what's up?

(name of peer)

How are you?

Comment/other/action/past

Ouch, you hit me.

You took my milk.

It not funny guys.

He has a towel, he washed his hands.

Question/self/action/present

My job, right?

Man, I helping, huh?

Me put it over here for you?

O.K. I sit right here?

What you (I) supposed to d~~o~~?

Hello, can I play?

You know where I sit?

Get myself a cookie?

Question/other/descrip/pres

How old are you?

What her name?

Where do you live?

Do you have brothers and sisters?

Do you have a bike?

What your name?

Comment/other/action/future

Next time, it's your turn.

She gonna tell me why not we gonna eat.

You guys gonna get it.

You play tag at recess.

Figure Captions

Figure 1. Initiation and expansion training data for Mark within simulated work and eating contexts.

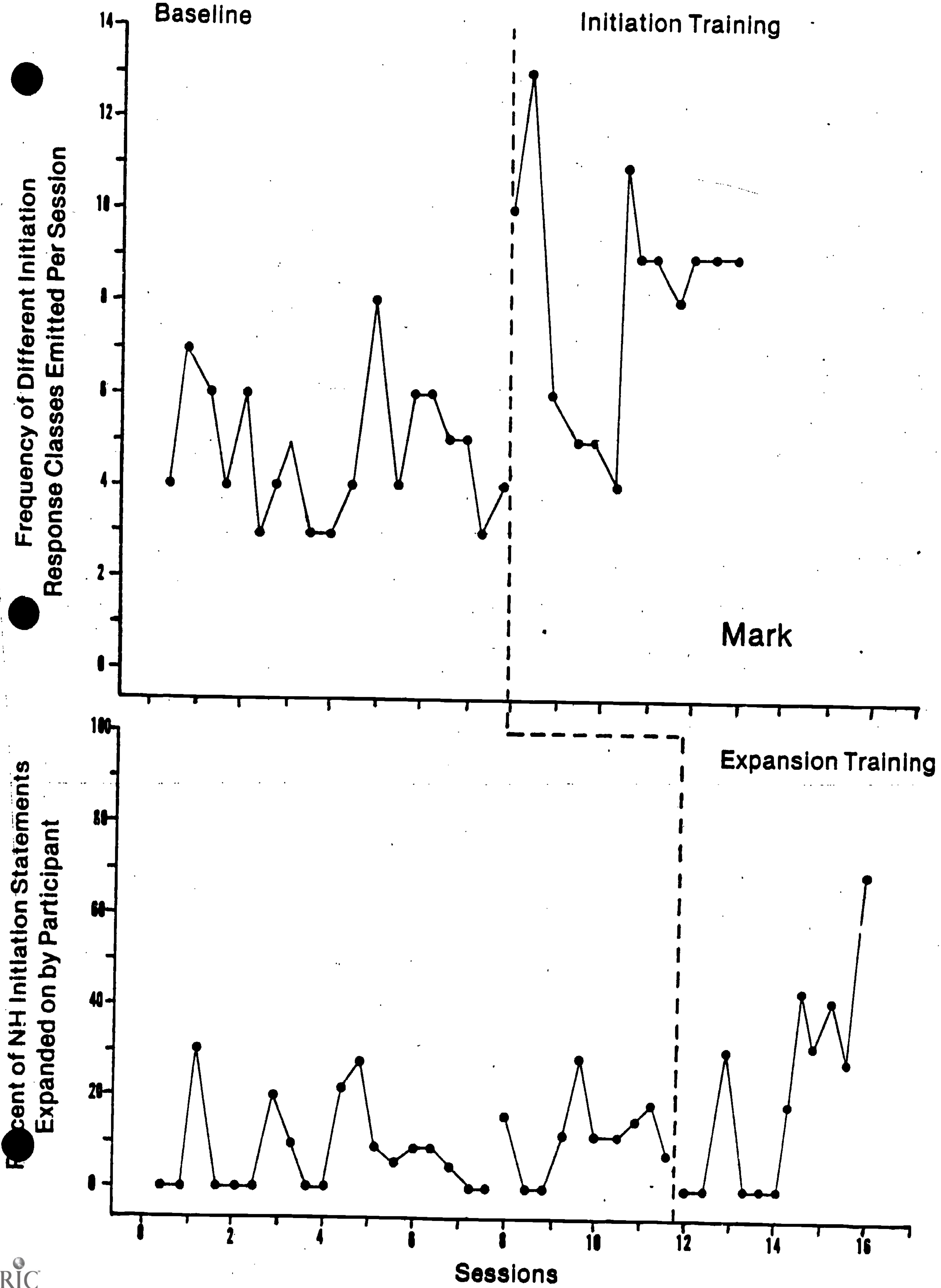
Figure 2. Initiation training data for Ann and Kim.

Figure 3. Generalization of Mark's expansions and diversity of response classes.

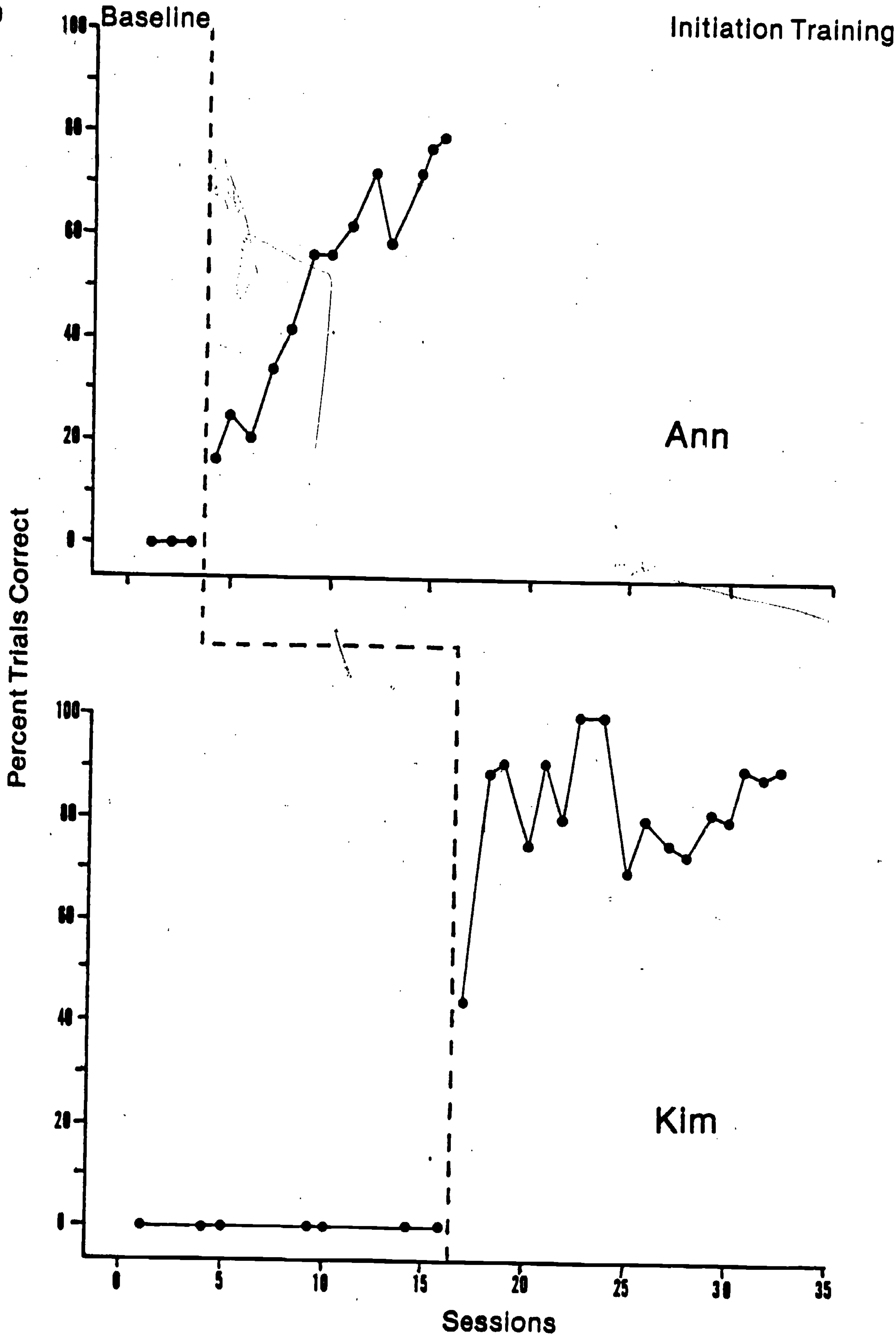
Figure 4. Generalization of diversity of initiation responses for Ann and Kim.

Figure 5. Generalization of number of new response classes not previously produced by Mark.

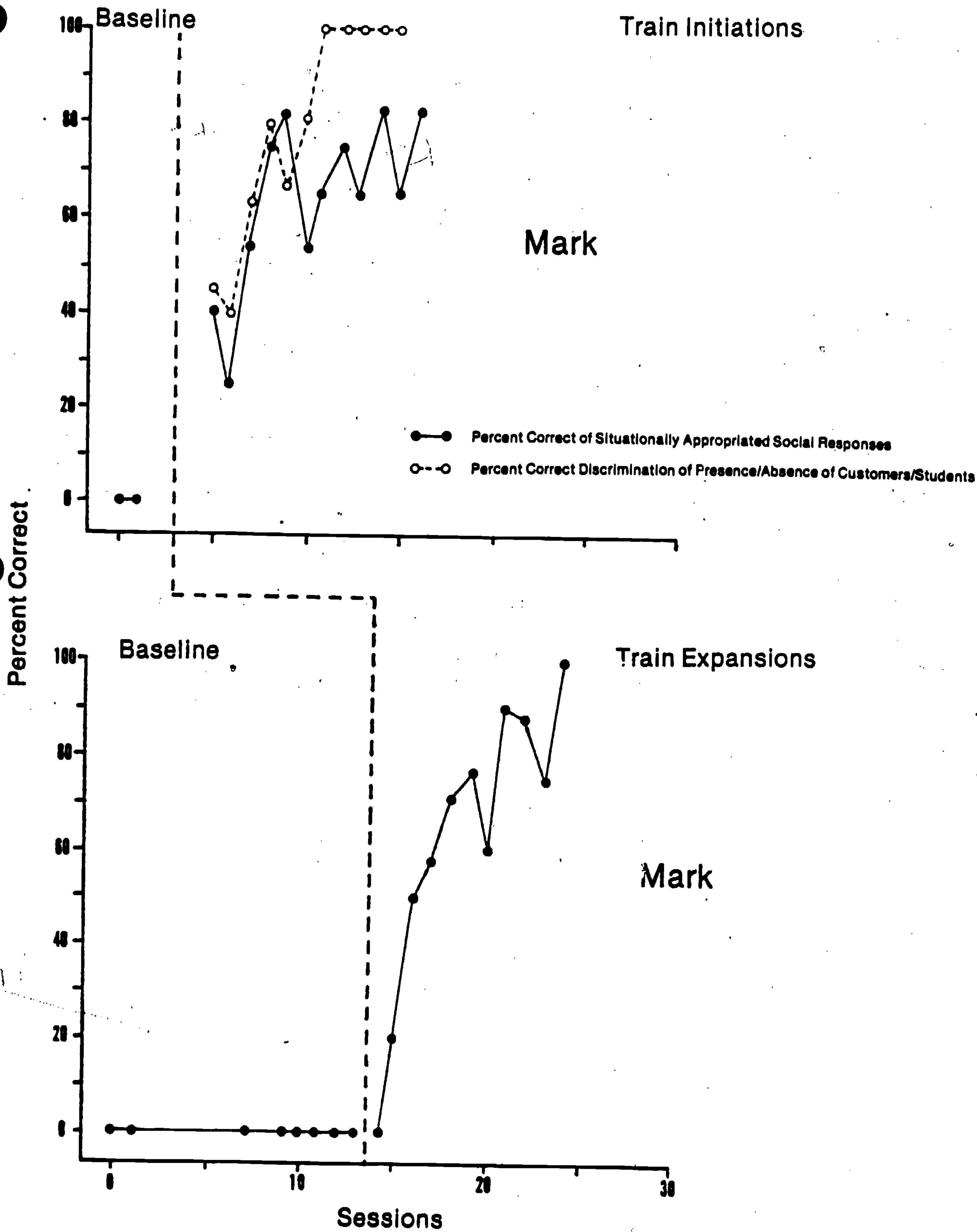
Figure 6. Generalization of number of new response classes not previously produced by Ann and Kim.

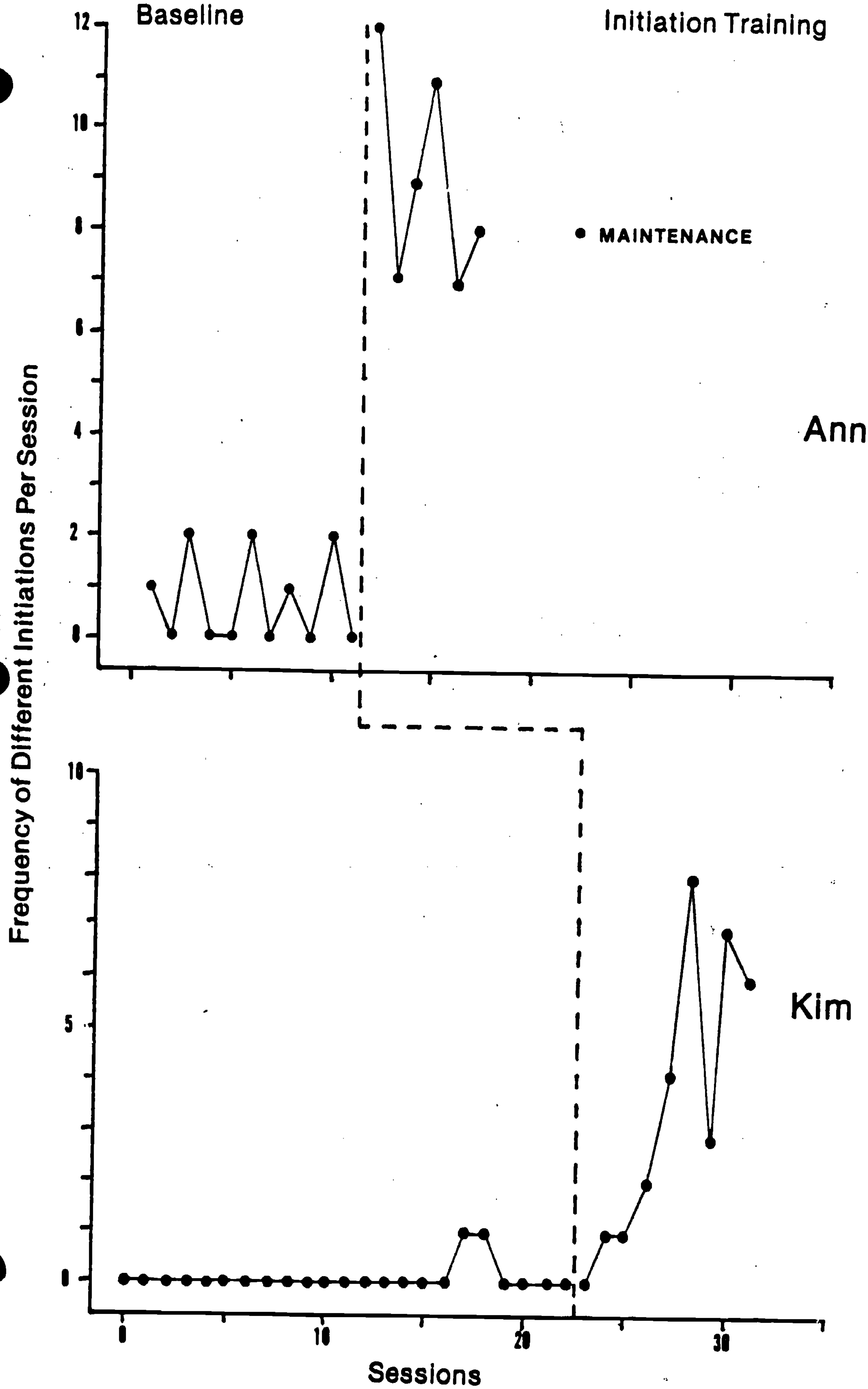


Baseline
Initiation Training
Expansion Training
Mark
Frequency of Different Initiation Response Classes Emitted Per Session
Percent of NH Initiation Statements Expanded on by Participant
Sessions

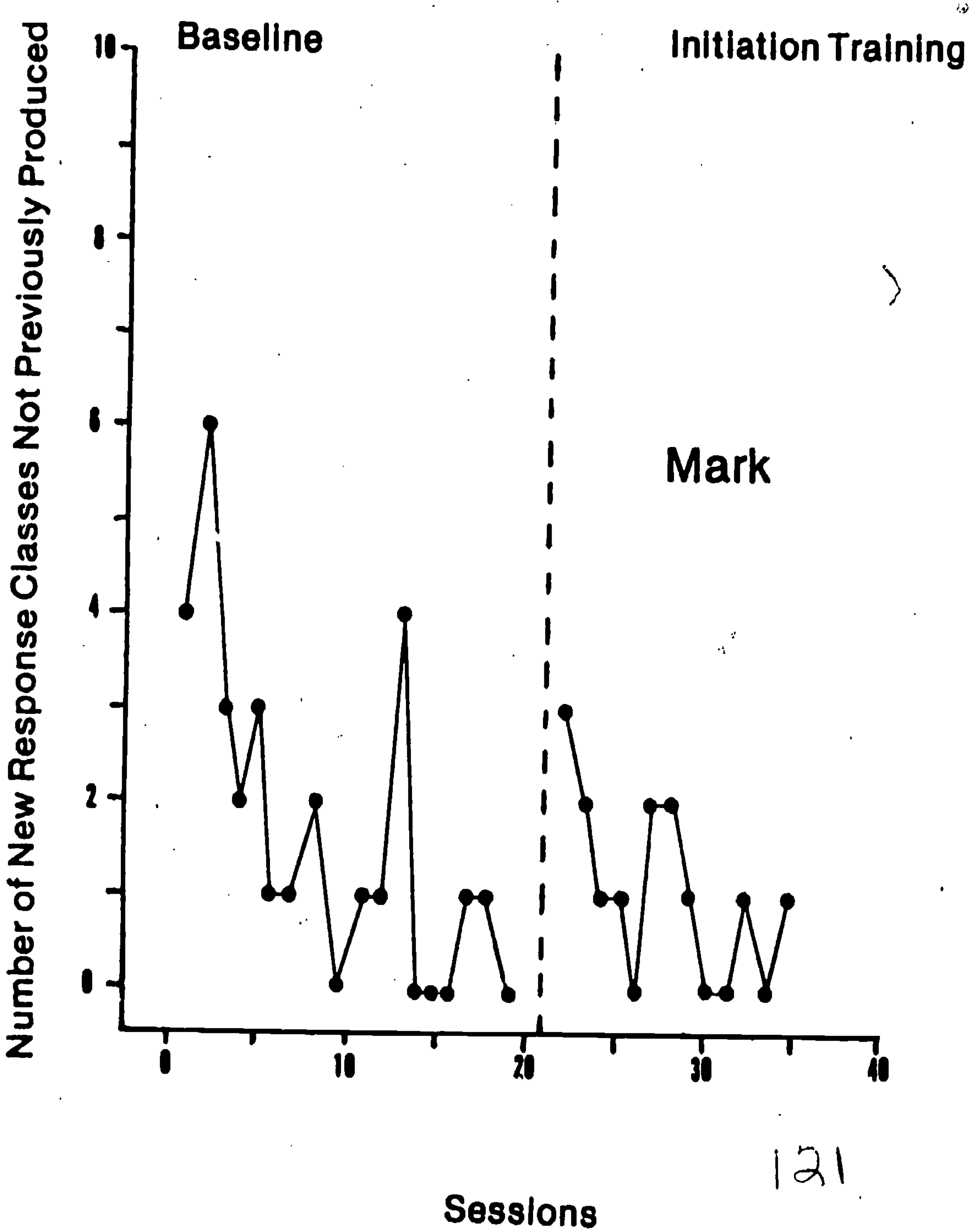


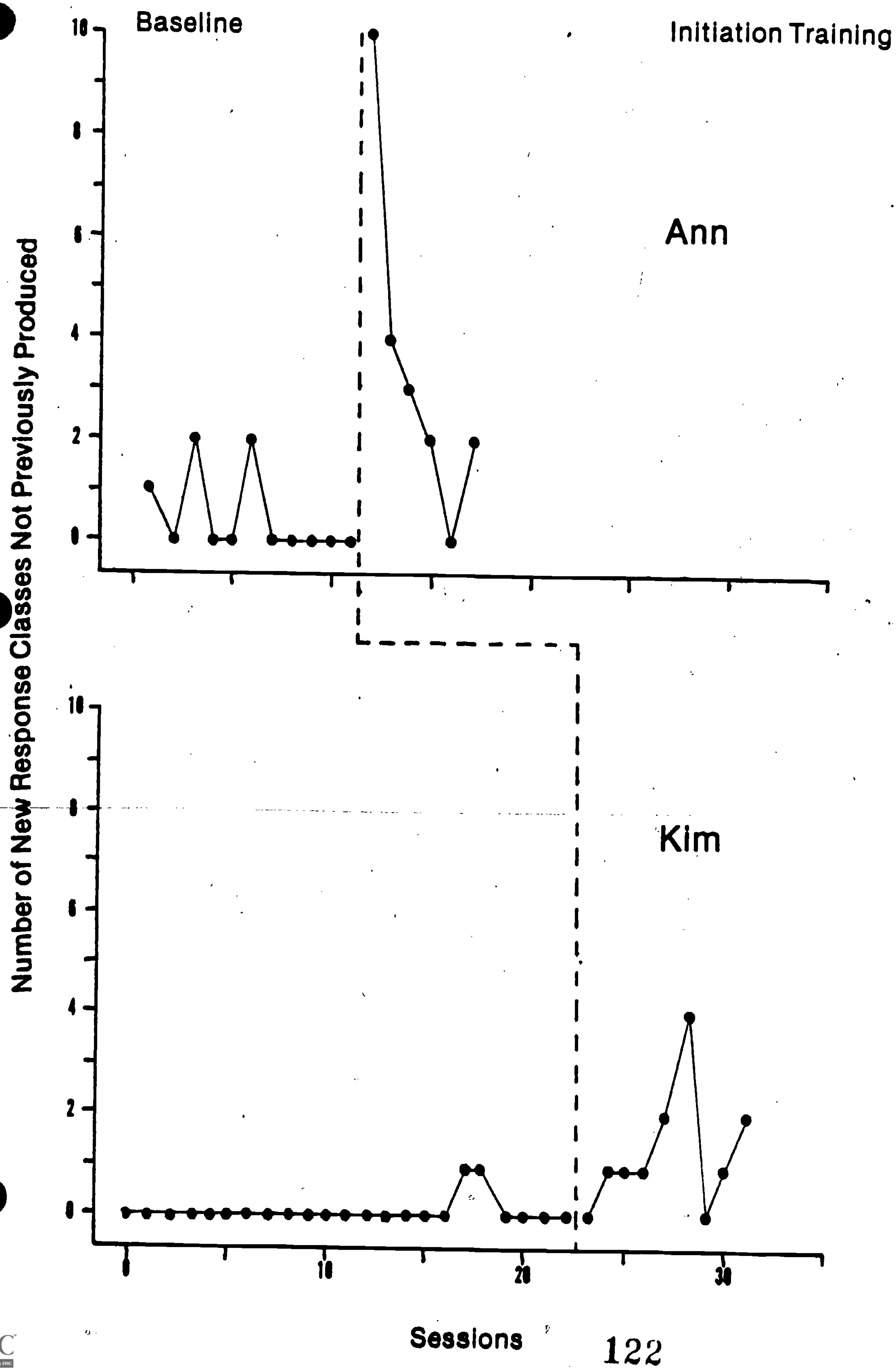
Baseline
Initiation Training
100
80
60
40
20
0
Ann
Percent Trials Correct
100
80
60
40
20
0
Kim
0
5
10
15
20
25
30
35
Sessions


Baseline
Train Initiations
Mark
Percent Correct of Situationally Appropriated Social Responses
Percent Correct Discrimination of Presence/Absence of Customers/Students
Percent Correct
Baseline
Train Expansions
Mark
Sessions



Baseline
Initiation Training
MAINTENANCE
Ann
Kim
Frequency of Different Initiations Per Session
Sessions


Baseline
Initiation Training
Mark
Number of New Response Classes Not Previously Produced
Sessions
0
2
4
6
8
10
0
10
20
30
40



Baseline
Initiation Training
Ann
Kim
Number of New Response Classes Not Previously Produced
Sessions

The Training and Generalization of Social Interaction during Breaktime at Two Job Sites in the Natural Environment*

Catherine Breen, Thomas Haring,
Valerie Pitts-Conway and Robert Gaylord-Ross

San Francisco State University
and
Marin County Office of Education

Running Head: Social Interaction during Breaktime

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Abstract

Four high-school level, severely handicapped autistic students were trained to initiate and sustain social interactions with nonhandicapped peers in a commonly shared break room at two community job sites. The generalization of social behavior to nontrained coworkers was probed in the same setting during natural break times. A multiple-baseline across subjects design was used to assess the effectiveness of a training package based on concurrent training of chains of responses using systematic prompting and reinforcement of correct behavior. Generalization was promoted using a multiple exemplar strategy. The results showed that all participants acquired a chain of social break behaviors using one peer trainer. Two participants displayed generalization of social responses prior to the acquisition of the complete chain. Two participants required training with multiple peers prior to the occurrence of generalization.

The Training and Generalization of Social Interaction during Breaktime at Two Job Sites in the Natural Environment

The feasibility of training and generalizing social skills has been repeatedly demonstrated with severely handicapped learners (Gaylord-Ross, Haring, Breen & Pitts-Conway, 1984; Hamre-Nietupski & William, 1976; Strain, Kerr, & Ragland, 1979; Strain, Shores, & Kerr, 1976; Strain, Shores, & Timm, 1977; Strain & Timm, 1974; Strain, Wiegerink, & Hester, 1975; Williams, Pumpian, McDaniel, Hamre-Nietupski & Wheeler, 1975). In spite of the general interest in programming for social interaction, the studies conducted to date have primarily been with young children who have been taught responses appropriate to free-play situations within school settings. As a consequence, relatively little is known about inducing social interaction with secondary, severely handicapped students in other natural settings.

As severely handicapped students approach and enter adolescence, the emphasis in instruction should change from a classroom based model to a community-oriented, service delivery model (Brown, Ford, Nisbet, Shirage, VanDeventer, Sweet, & Loomis, in press). Once service delivery is shifted to community situations, the relevance of social skill training oriented solely towards play and leisure contexts must be questioned. It is unlikely that social instruction organized around leisure responses in school settings will generalize to natural, community social contexts. For example, games and play activities which often structure social interactions in school situations are not present or appropriate in shopping, bus riding, or working situations in the community. Thus, although severely handicapped learners may have been exposed to a social skills curriculum in order to foster integration into the public schools, a longitudinal program of social training is needed to facilitate successful integration into vocational settings (Gold, 1975; Mithaug & Haring, 1977) and community residences (Gollay, 1976).

In the present study a procedure was developed to promote interactive social behaviors between autistic students and their nonhandicapped coworkers during breaks from jobs at actual workplaces. The purpose of the study was to test a social training procedure that could be used in natural vocational environments. A key issue in social skill training is that the responses learned need to be generalized to coworkers. That is, once training has occurred, the learners should generalize the social responses to other coworkers in the absence of direct prompting or reinforcement to do so. Furthermore, the effects of a social skill training procedure should be evaluated not only by the acquisition and generalization of the targeted responses, but also by the reciprocal effects of the responses on the coworkers. Thus, in order to ensure that the social exchanges are functional in terms of community integration, the responses selected should be naturally reinforcing to both the handicapped workers and their coworkers.

Method

Participants

Four male students from a class for autistic and severely handicapped students participated in the study. The participants were diagnosed as autistic by an independent agency prior to their enrollment in the school program. The participants attended school at a regular high school campus with numerous opportunities for social interaction. Although three of the participants had been trained to initiate social interactions during breaktimes at school, they had never attempted to initiate interactions with their coworkers during breaktime at their jobs. The participants were selected for use in the investigation based on the following criteria:

1. Each was capable of working for 10 to 15 min without direct prompting or reinforcement at vocational tasks.
2. Each could learn new skills through modeling and each could initiate five to six word statements.
3. Each showed an absence of spontaneous social responses in all settings unless the responses were specifically trained.
4. Each student required several exemplars before generalization to people or places occurred.

Don, 18 years old, was capable of completing a variety of functional tasks including riding public transit, shopping, and cooking basic meals. He could follow three-step commands and he would spontaneously request trips to a local pizza parlor, trips to the grocery store and food items. Don had a history of self-aggressive behavior including hand biting, head striking, breaking windows, and throwing objects. Such behaviors occurred at the rate of six to nine times per year and were usually precipitated by a change in his routine by parents or teachers. Don rarely initiated interactions with peers or instructors. He would respond "Hi" to greetings by staff or high school peers. He typically avoided eye contact. During breaktimes, when approached by peers, Don would run to unoccupied areas within the break setting.

Mark, age 21, was also capable of many basic adaptive skills. He showed mastery of cooking simple meals, shopping for three to four items, and a variety of cleaning skills. Mark's expressive vocabulary contained approximately 100 words. He spontaneously requested food items, trips to the bathroom, and access to record albums. He followed two-step commands and understood approximately 150 words. Mark's social interaction patterns were highly stereotypic and predictable. Mark would approach familiar peers and repetitiously ask for food or objects held by others. Mark actively avoided eye contact and close proximity to others. He would respond to simple initiations but rarely acted as the initiator. Mark engaged in high rates of self-stimulatory behavior during his free time which functionally served to terminate contact with peers.

Jon, 18 years old, showed mastery of most basic adaptive self-help skills. Jon used a card communication system consisting of previously written statements which he would show to people in specific situations. His receptive vocabulary was approximately 200 words and he was able to follow two-step commands. Jon engaged in high rates of hand flapping and rocking during free time periods. Jon initiated interactions with several familiar peers. However, many of his initiations consisted of facial grimaces, giggling, hugging, and kissing. He rarely made eye contact with peers during social exchanges.

Earl, age 18, could independently dress, shop for three items using a hand-held calculator and a shopping list, and cook several simple meals. He would spontaneously request lunch, trips to the bathroom, and money for vending machines. His responses to questions or commands were completely or partially echolalic. For example, to the question "What are you doing?" he would answer "You are doing the work." His speech was clear, yet labored and mechanical. Earl had a receptive understanding of approximately 150 words and was able to carry out two-step directions. Earl had received little social skill training prior to the study. He never spontaneously approached peers to initiate interactions, but he would not actively avoid peers if they approached him.

The Training Coworkers were four high school students, 17-18 years old. High school students were used during training sessions rather than utilizing actual coworkers in order to maintain the purity of the natural setting and the perceptions of the employees toward their handicapped coworkers. The type of contact one has with persons with severe handicaps often effects the subsequent perceptions of those individuals. Some researchers have suggested that establishing a teacher-student relationship between two individuals might lower one's overall attitude toward that individual in need of instruction (Voeltz, 1982). Consequently, it was decided to use persons not in the natural environment for the purposes of training. The high school students were volunteers who had no previous contact with the handicapped participants prior to the study. They received high school credit for participation in the investigation. All of the training coworkers were trained to respond socially in the manner described in Table 1 prior to the study through role-play activities. A script was supplied to the coworkers. The importance of being "natural" during an interaction was emphasized. In other words, each training coworker was encouraged to alter his responses from session to session in order to train the participants to generalize the trained behaviors to a variety of stimuli; each was instructed to simulate breaktime behavior characterized by assuming a relaxed position in a chair near a coffee table, and browsing through magazines; and each was instructed only to respond to and produce initiations which were appropriate to the social situation, and to refrain from prompting, correcting, or reinforcing behavior. The experimenter was to provide all systematic prompts, corrections, and reinforcers during a training session.

Insert Table 1 about here

<u>The Natural Coworkers</u> were people who held regular jobs at the vocational sites. Natural coworkers ranged in age from 18 to 50 years old. Typically, the same natural coworker would be present during work and break times.

<u>Settings and Tasks</u>

Two businesses were used in the study. The selection of environments was based on: (1) the close proximity of each site to the school campus, allowing for the feasibility of training with peer tutors, and independent mobility to and from the job site by each of the participants; (2) task requirements for each site being teachable and similar to already familiar vocational tasks; and (3) the potential for volunteer status to transition to paid employment. Don and Jon worked for one hour per day (10:00 - 11:00 am) in a retirement complex spread over three acres of land. Their duties included weeding, watering, raking, sweeping, turning flower beds, painting, and vacuuming. A breakroom located at the center of the complex was used by all workers. Breaks were taken intermittently by all staff with 5-10 workers on break at any given time. Social skill training was conducted in the breakroom. The room was 3 x 8 m and contained a 1 x 4 m table, eight chairs, a hot water dispenser, instant coffee, cups, spoons, sugar, and cream.

Mark and Earl worked for one hour per day (1:00 -2:00 pm) in a French restaurant. Their jobs were to bus and wash tables, rinse and load dishes into a commercial dishwasher, and put items away after clearing. They worked among 15 other employees. Breaks were taken in the main restaurant after the lunchtime crowd had left. Typically, coworkers would gather in groups of 5 or 6 people at various tables in the restaurant. Coffee, cups, spoons, sugar, and cream were available at a counter in the back of the restaurant.

Procedure

Baseline and generalization probes. Two types of probes were conducted; baseline probes at the simulated breaktime with training coworkers; and generalization probes at the natural breaktime with natural coworkers. At least one training baseline probe was conducted randomly in the presence of each of the four training coworkers during the baseline phases for each participant. The baseline training probes began when the instructor gave a cue to "take a break". The student was given 20 sec to finish his task and leave the work area. If he did not appropriately respond to the cue, the experimenter verbally and physically prompted the student to go to the breakroom and repeated the cue "take a break." One of four training coworkers was present in the setting. The experimenter removed herself from the breakroom to a position outside the door or on the other side of the kitchen/restaurant passthrough, where she was able to clearly hear and observe the social behavior produced by the participants.

All generalization probes were conducted during the natural breaktime in the same manner as the baseline training probes with the exception of the presence of 5-10 natural, nontrained coworkers and the absence of the training coworkers. During both baseline and generalization probe sessions, no prompts or reinforcers were given by the experimenter or the training coworkers once the participant was in the setting and had been given the cue to take a break.

Social skills training. Training was conducted individually with only the first author, the student, and one training coworker present. Training occurred at least a 1/2 hour after the natural break in the work setting. No natural coworkers were present during training sessions. A multiple exemplar strategy (Stokes &

Baer, 1979) was employed to promote generalization. That is, the student was first trained to initiate and interact with one training coworker. Meanwhile, generalization probes were taken during the natural breaktime. If the student reached criterion (80% of the social steps from the task analysis in Table 2) but had not generalized to natural coworkers, social training with a second training coworker was begun. Thus, training coworkers were progressively added until generalization occurred to at least three different natural coworkers.

Insert Table 2 about here

The training was organized following a concurrent task (Gaylord-Ross, 1981; Schroeder & Baer, 1972) or total task strategy. Each training trial began with the student at work. The experimenter then gave a cue to "take a break." The student was verbally praised if he independently performed any step from the task analysis. If the student did not initiate the next step in the sequence within three sec, a prompting strategy was implemented. Prompts were given in the following sequence: 1) indirect verbal (e.g., "what do you do next?"), 2) direct verbal (e.g., "go make coffee"), 3) gestural (e.g., point to coffee), 4) partial physical (e.g., guide hand to spoon) and 5) full physical (e.g., guide hand to spoon, place on spoon, and push fingers to grasp spoon). All verbal social responses were trained using either indirect models (e.g., "what do you say?") or direct models (e.g., say "want coffee?"). Prompts were given in the order of least to most intrusive. Modifications made by the participants of the verbal responses, which altered the syntactical form of the statement but maintained the meaning, were judged as acceptable responses.

While verbal praise was initially given for each independent step from the task analysis it was subsequently thinned. After the students independently initiated a step three consecutive times, praise was thinned to every other time for that step. Once the student could independently respond to two consecutive steps on the FR-2 schedule, reinforcement for the preceding step was discontinued. Independence within the total chain of responses was built by gradually requiring more responses in sequence before praise was given. This was done by requiring the addition of one more correct step in a sequence from one session to the next. The multiple occurrences of praise were potentially available in the beginning of training as the entire chain was being learned. A participant might independently emit, for example, steps 1-4 in the task analysis, be reinforced for 4 independently produced behaviors, make errors on steps 5 and 6, produce steps 7-10, be reinforced again for 4 consecutive behaviors, make an error on step 11, and complete the chain independently. The following session would then require the production of at least five consecutive responses prior to the delivery of reinforcement. If the criterion for reinforcement was not met during a given session, it remained at the existing level. Verbal reinforcement was enthusiastic, yet brief, so as not to interfere with the natural flow of the chain. An error in responding during chain training resulted in a correction procedure which was identical to the prompt sequence.

Following tho strategy developed by Bellamy, Horner and Inman (1979), steps which proved difficult to learn (incorrect or no production of a given step for 10 consecutive sessions) were pulled out of the chain for massed trial instruction. That is, the S^D for that step was given and if the student did not produce the correct response within three sec, the prompting sequence was initiated. A total of 10 trials were conducted in a given massed trial session.

Training sessions lasted for approximately 15 min. A session consisted of one complete performance of the chain (a trial). If students engaged in aberrant behavior (defined as singing, saying nonsense statements, repeating commercials, striking self, others, or materials, running, or making repeated facial grimaces) during a session they were verbally prompted to continue to the next step in the task analysis. If their behavior continued, they were given a specific warning to stop the behavior. If the behavior still continued, the session was terminated and the participant was returned to work. Reinforcement in the form of a pleasant chat and sharing coffee or coke with the training coworker and experimenter followed each completion of a trial.

Measurement

During baseline, generalization, and training sessions the experimenter recorded the number of steps of the task analysis (Table 2) independently produced by the student. Data for the social steps in the task analysis (marked with an asterisk in Table 2) were separately analyzed from the purely motoric responses in order to assess the acquisition and generalization of the social responses more sensitively than would be possible if the total chain were analyzed. Baseline probes were taken intermittently so as not to inadvertently train nonresponding in the breaktime setting. Measurements were taken at least one time out of every five consecutive work days with the assignment of probe to the day of week randomly determined. Once training was begun, generalization probes were to be conducted daily in order to assess the continuous linear relationship between the amount of training and the number of exemplars necessary and sufficient for the production of generalized social behavior. Generalization was scored at + for a session when the participant approached a coworker, emitted a greeting, and offered to get the coworker a beverage. All three behaviors were required in order for one occurrence of generalization to be scored.

Additionally, during generalization sessions with natural coworkers, anecdotal notes concerning the context and nature of the interaction were kept. The observer recorded the responses of the natural coworkers as accurately as possible. In addition, a subjective appraisal of the social interaction was made by coding the social willingness of the coworker into three descriptive categories; a) active willingness in the interaction was indicated by initiating other social exchanges or commenting on the ongoing responses of the participant; b) passive willingness was indicated by responding in a socially polite manner (i.e., saying "Hi" or "thank you" or "no, thank you" when offered coffee) but not extending the interaction; c) active avoidance was indicated by terminating the interaction by saying "no" to offers of coffee and moving to another table or directing the participant to go to another table.

Agreement Checks

Agreement data was taken during training and natural probe times by having sessions scored by two observers. Three graduate students in special education served as reliability observers. The observers had extensive prior histories of recording behaviors in task analyzed chains. For all agreement sessions the observers stood at least four m apart.

Within the training context, agreement data was recorded an average of 26% of the baseline training sessions and 34% of the training sessions for each participant. The percent agreement as to the steps marked + or - was calculated according to the formula $\frac{A}{A+D} \times 100$ (where A = number of agreements on steps marked by each observer, and D = the number of disagreements). An inter-observer agreement of 100% was attained on all occasions when scoring the occurrence or nonoccurrence of social and motor behavior from the task analysis within the training context.

During the natural generalization probe times, agreement data was first taken regarding the occurrence or nonoccurrence of the three behaviors jointly required for generalization (approach + greet + offer) to nontrained coworkers. Again the formula $\left(\frac{A}{A+D}\right) \times 100$ was used to calculate the percent agreement between the two observers. Measurements were taken for each participant on an average of 29% of the baseline sessions, and 29% of the probes taken during the intervention phase. 100% agreement was found on all natural breaktime sessions where agreement data was scored.

Additionally, agreement measurements were taken regarding the quality of the response of the coworker in the natural setting to the initiation made by the participant. Of the 25 occurrences of generalization observed by the experimenter, 7 were also witnessed by an agreement observer. One out of 7 initiation behaviors (session #19 for Don) was judged by both observers to be responded to with an active avoidance reaction resulting in 100% agreement regarding that category. Five of the occurrences of generalization (sessions #20 and #22 for Don, #35 for Mark, #28 for Jon, and #55 for Earl) were scored by the experimenter as reacted to with passive willingness to interact, while the observers scored four of the initiation responses (sessions #20 and #22 for Don, #35 for Mark, and #55 for Earl) as resulting in passive willingness. The scoring of passive willingness reactions consequently showed 80% agreement between the observers. Finally, one response was scored by the experimenter as followed by active willingness to interact (session #31 for Jon), while the observers scored two instances of active willingness (session #28 and #31 for Jon). The percent agreement within this category was determined to be 50%. Agreement overall for subjective categorization was 85%. Percent agreement was again calculated using the formula $\frac{A}{A+D}$ x 100.

Experimental Design

A multiple baseline design across four subjects (Hersen & Barlow, 1978; Kazdin, 1982)) was used to assess the functional control of the participants' behavior by the training package.

After stable baselines were achieved in at least five consecutive sessions for each participant, one participant was randomly selected to receive intervention. When a reliable change in the first participant's behavior was attained the same treatment was then used to sequentially alter the behavior of the remaining three participants.

Results

The baseline sessions yielded 0% correct responding for all four participants (Figure 1). Once training was begun all participants successfully met the training criterion (83% correct) using one training coworker. The participants met the training criterion within an average of 8 training sessions and a range of 4 to 12 sessions.

Insert Figure 1 about here

Jon and Mark required one training coworker exemplar, whereas Don required two and Earl required three exemplars before generalization occurred to natural coworkers (see Figure 2). On session #13 Don emitted 83% of the social behaviors, but did not generalize the behaviors during the subsequent probe session, and consequently training was begun with a second training coworker. A significant drop in performance occurred as a result of the change of trainers. Generalization was seen following three additional sessions of training with the second coworker.

Insert Figure 2 about here

Similarly, Earl reached the criterion of 80% on session #44, yet showed no attempts to generalize (see Figure 2). He showed a slight drop in performance upon the introduction of coworker #2. He again reached criterion on session #48; yet still failed to generalize. A third training coworker was begun, resulting again in an initial decrease in performance. Generalization occurred on session #52 following three sessions of training with coworker #3.

For two participants, Mark and Jon, generalization occurred using one training coworker prior to the acquisition of less than 80% of the social behaviors (see Figure). Mark began to generalize the trained behaviors to natural coworkers following 11 sessions of training at which time he successfully emitted 67% of the social behaviors. Jon generalized after two training sessions and at a performance level of 16% independently produced social behaviors.

Training sessions and generalization probe sessions occurred daily as is shown in Figures 1 and 2. Missing data points reflect either the absence of the participant or training coworker, the work site being closed that session, or termination of the session due to the occurrence of aberrant behavior. Two sessions were terminated with Mark for failure to heed a warning. No sessions were terminated with the other three participants.

Figure 2 shows the cumulative number of generalized interactions and was produced by calculating the number of occurrences of the approach, greeting, and offering steps from the task analysis. All participants generalized to three or more coworkers in the natural break setting (mean = 4.0 different coworkers).

When the participants generalized the social interaction responses, they approached only one coworker per breaktime, as was taught within the training sessions. This frequency of initiation was considered appropriate social behavior. Repeated greetings and offers of coffee within the restricted time and space available would have appeared unnatural and unusual, even under circumstances when the coworker turned down an offer. Typical break behavior among nonhandicapped employees in these two settings was characterized by locating a place to sit and remaining in that place for the duration of the break while smoking, drinking coffee, tea, or cola, and conversing or reading a magazine. Don, Jon, and Earl showed a consistent pattern of generalization. That is, once generalization occurred these participants consistently initiated one interaction per session. Mark, however, generalized less consistently, in that once he first generalized (session #29) he did not generalize during all of the other sessions (e.g., #s 30 and 33).

Descriptive Data

Of the 25 interactions initiated by the four participants, 3 were classified as active-avoidance interactions, 15 as passive willingness interactions, and 7 as active willingness interactions. Anecdotal information showed that three initiations by a participant resulted in a negative reaction by a coworker in the natural break setting. All negative reactions occurred in the break room at the retirement complex.

Jon and Mark produced untrained, spontaneous social remarks to natural coworkers on 2 and 3 sessions, respectively. These social expansions occurred after the initial occurrences of generalization (for Jon, on session #29 and #31, for Mark on sessions #s 32, 34, & 36) and took the form of initiations and responses. The content of the expansions included identification of particular points of interest in ads in a magazine and things to do and people to see after work or that weekend. In instances when Jon and Mark spontaneously produced extended interactions, coworkers typically responded by saying "Oh, that's nice" and attending to the participant. They did not, however, reciprocally extend the interaction.

A total of 7 of the 25 interactions (28%) were characterized by an active willingness to interact with the autistic workers. Typically, the positive interest in the participant by the coworker was evidenced by asking direct, simple questions, such as, "What did you do this weekend?" or "What have you been doing?" On two occasions the natural coworker introduced the participants to other coworkers at the break table.

Discussion

A group of autistic youth were successfully taught to converse in a vocational break environment. The students were taught an extended chain of behavior that contained both social and motor responses. The study replicated previous work with autistic students where extended social chains were taught within a leisure context (Gaylord-Ross et al., 1984) and nonhandicapped peers were used as training agents (Egel, Richman, & Koegel, 1981; Gaylord-Ross et al.).

The study also demonstrated the ability of students with severe impairments to learn in natural, community-based settings. Brown et al. (in press) have pointed to the importance of training the severely handicapped students in the natural, criterion environment like a work site, an apartment residence, etc. When training is conducted in natural settings, the problem of forcing generalization of skills from classroom simulations to real life environments is eliminated. While three out of four of the participants in the present study had previously received similar training of extended social chains within the high school setting, no spillover was seen in one of the criterion environments, the natural work site. Consequently, it was necessary to train directly in the community environments. For future study, an examination of the effects of direct community training on performance generalization to other similar community settings would be necessary in order to determine whether training social work behavior within volunteer work sites is sufficient to produce similar behavior in future work environments.

Overall, both the retirement facility and the restaurant were successful targets for volunteer employment. The employees were quite acceptant of the students. The qualitative recordings of the responses made by nonhandicapped coworkers, specifically in the break setting, indicated only 3 out of 25 instances where avoidance responses were made following initiations of the autistic students. There was some active willingness by the coworkers to continue the interaction. The largest proportion of coworker responses was to respond in a polite manner but not to extend the interaction. Thus, the bids by the students did lead to meaningful social responses of different types by the coworkers, i.e., an interaction occurred.

All avoidance reactions occurred following an approach made by one participant in the break room of the retirement facility. To achieve successful integration in the future, it may be helpful to analyze the kinds of settings where the contact group is more or less responsive to bids from handicapped persons based on the work responsibilities of the employees. The coworkers in the retirement facility, for example, might have exhausted their interest in interacting with "clients" during their working time and had little interest in engaging in perceived "caretaking" interactions during their break. It is important for future research to examine the varieties of social environments in school and work settings with respect to their responsiveness to social bids from handicapped persons.

In the present study the autistic students generalized their social behaviors across people, from nonhandicapped peers to nonhandicapped coworkers. The number of peers or training exemplars needed to promote generalization varied from one to three across the four students. For two participants, repeated training with one exemplar was sufficent to produce generalization; that is, once these students were able to accurately produce context specific social responses, they generalized their behavior to a variety of natural coworkers. For two participants, generalization required two or three exemplars.

Thus, the study did not shed light on the critical number of exemplars needed to promote generalization (cf., Stokes & Baer, 1977).

Some evidence of response generalization was noted for two of the participants on two and three occasions, respectively. Future work in this area might produce greater amounts of response generalization under more flexible, loose training conditions than were used in the present study. While the present research allowed flexibility in the syntactical presentation of trained social responses, because of the limited language capabilities of the participants, little was done to systematically encourage spontaneous production of novel social responses. A strategy which trains a variety of initiations and responses preceding and subsequent to a variety of nonhandicapped behaviors might encourage the emission of a wider variety of untrained social behaviors. Additionally, training social responses under distributed learning conditions, for instance at appropriate times throughout the work day, might aid in developing a greater social repertoire for the handicapped individual. Finally, during work, rather than breaktime, there was no interaction between the handicapped students and their coworkers. Perhaps if interaction had occurred at this time there would have been a greater proclivity to interact at breaktime. Overall, the study was successful in teaching previously isolate autistic youth to make social bids and extended social interactions toward nonhandicapped coworkers in a community-based vocational site.

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Table 1

Training Script for Autistic and Nonhandicapped Students

Autistic Student	Nonhandicapped Student
1. Hi, how are you?	
	2. Fine. Not bad. Pretty good. Great.
3. Would you like coffee?	
	4. Sure. Yes. That would be great. No thanks.
5. What's new?	
	6. Oh, not much. They started me on a new job today. 7. What have you been doing at work?
8. Doing dishes. Putting dishes away. Watering. Raking. Weeding.	
	9. I gotta go. Take it easy.
10. Take it easy.	

Table 2

Task Analysis of Breaktime Social Sequence

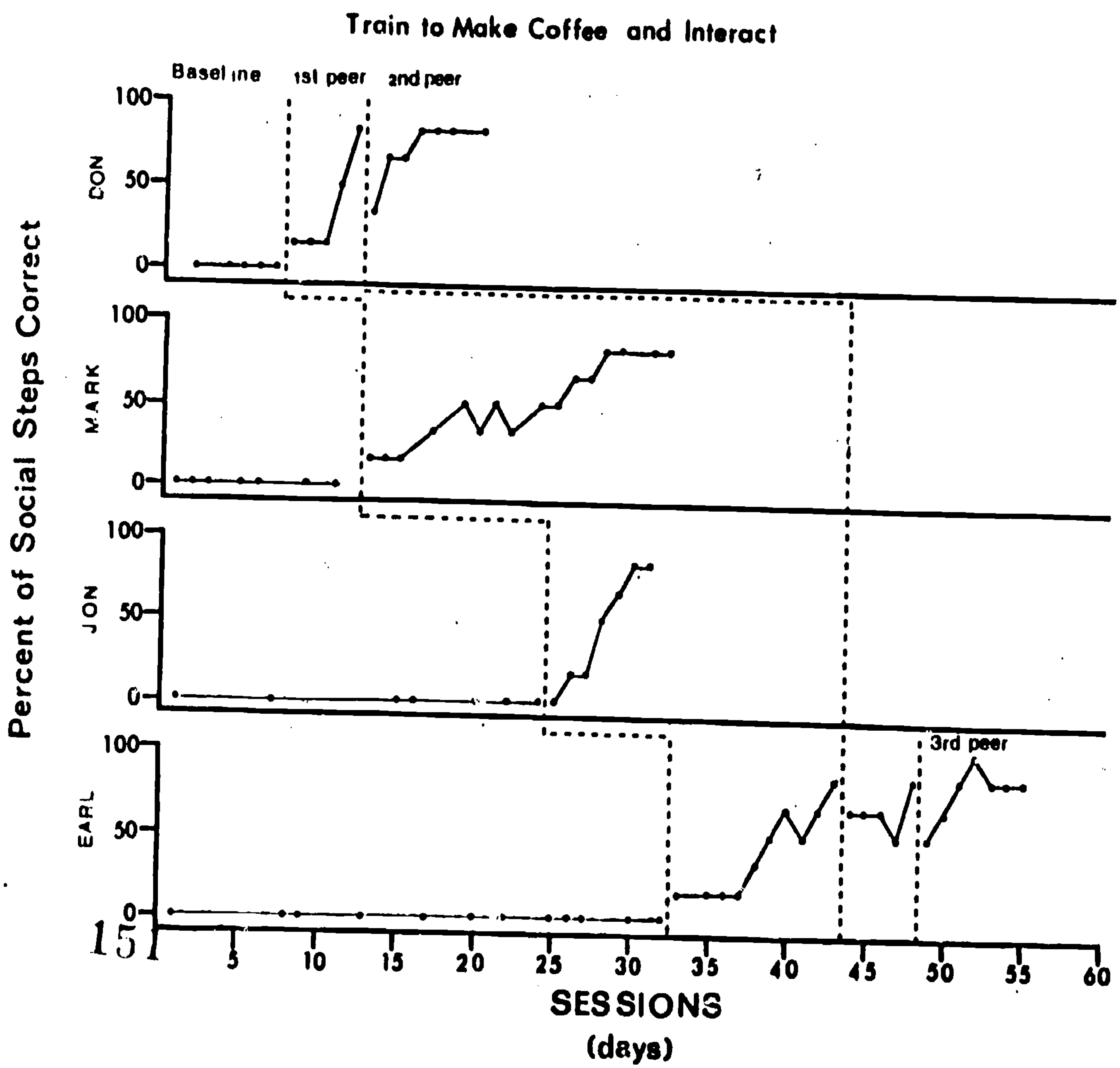
1. S. leaves work area.
2. S. pours a cup of coffee.
3. S. adds 1 spoon/packet of sugar.
4. S. adds 1 ounce of milk.
5. S. takes coffee to any table and sits down.
*6. S. asks familiar NH coworker/peer, "Hi, how are you?"
*7. S. asks NH "Would you like coffee?"
8. S. pours a cup of coffee for NH.
*9. S. hands coffee to NH.
*10. S. asks NH "What's new?"
*11. S. responds appropriately to NH question "What have you been doing at work?" (i.e., "doing dishes," "raking," "weeding.")
*12. S. responds to NH statement "Take it easy" with "Take it easy."
13. S. returns to work.

Note. Steps with asterisks are social behaviors. Steps without asterisks are motor behaviors.

Figure Captions

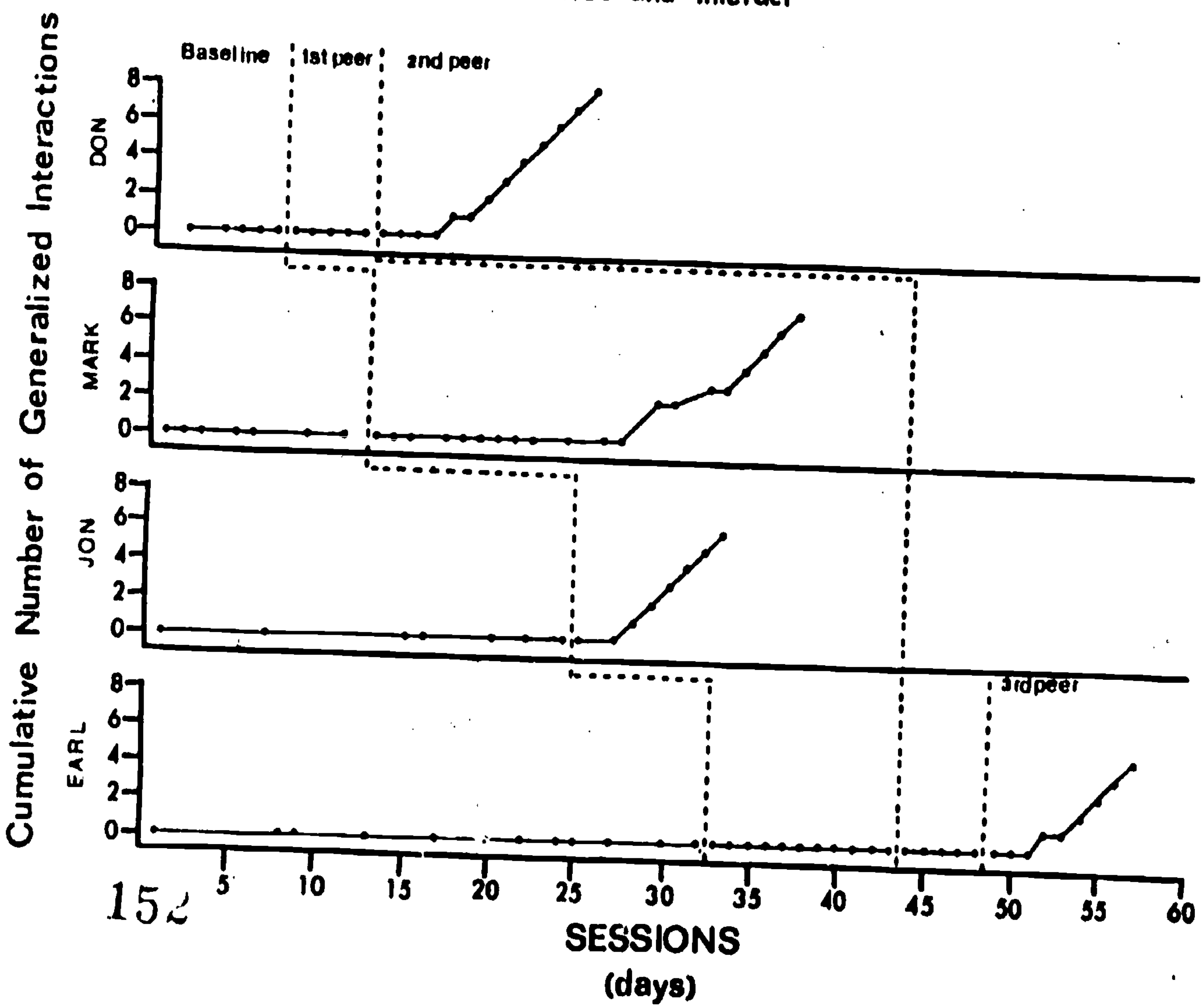
Figure 1. Percentage of social behaviors in the task analysis independently produced during training sessions.

Figure 2. The cumulative number of independent interactions initiated by autistic workers toward nonhandicapped coworkers during vocational break probe settings.



Train to Make Coffee and Interact
Baseline
1st peer
2nd peer
3rd peer
CON
MARK
JON
EARL
100
50
0
Percent of Social Steps Correct
5 10 15 20 25 30 35 40 45 50 55 60
SESSIONS
(days)

Train to Make Coffee and Interact



Training Between Class Generalization of Toy Play Behavior to Children with Severe and Moderate Handicaps

Thomas G. Haring

Special Education Programs

University of California, Santa Barbara

Running Head: Between Class Generalization

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Abstract

This study describes a training program in which young children with severe and moderate handicaps were taught to generalize play responses to multiple sets of toys. A multiple probe design, replicated with four children was used to assess the effects of generalization training within four sets of toys on generalization to untrained toys from four other sets. The responses taught were unique for each set of toys. Results indicated that training to generalize within two sets of toys was associated with stimulus generalization of other sets that did not formerly show generalization in three participants. Probes were also taken on responses to two additional sets of toys that differed from the previous sets in topography and in the effects that the toys produced. While the participants generalized to between 50% and 100% of the toys that were similar in responses and effects they did not generalize to toys from the disimilar sets. Implications for conducting research using strategies based on response interrelationships in training contexts are discussed.

Training Between Class Generalization of Toy Play Behavior to Children with Severe and Moderate Handicaps

Although developmental psychologists have described responses as occurring in organized systems (e.g. Piaget, 1980), and have indicated that the organization of responses may influence generalization (Husiam & Cohen, 1981), behavior analytic reseachers have only recently studied some of the possible effects of response interrelationships. The recent interest in response-response relationships is largely due to the introduction of principles from behavioral ecology into the behavior analytic literature (Willems, 1968,1974; Warren & Rogers-Warren,1977). Voeltz and Evans (1982) reviewed the existing literature concerning response interrelationships. In those studies reviewed, response interrelationships were usually defined as an alteration in the frequency of a response when the frequency of another response changed as a function of changes in environments or the addition of a treatment variable.

The construct of the response class (Skinner, 1935,1953) has been invoked to theoretically account for observed interrelationships between responses (e.g. Sherman, 1964). Inherent in the definition of a response class is that responses may occur under the same or similar stimulus conditions if the responses are effective in producing similar effects. Therefore, an alteration designed to effect a single response may also effect functionally related responses.

Two strands of research have contributed demonstrations of response-response relationships. A variety of statistical models have been employed to identify clusters of responses including factor analysis (Kara & Wahler, 1977), cluster analysis (Lichstein & Wahler, 1976), and lag sequential analysis (Strain & Ezzell, 1978). Following this strand of research, Strain and Ezzell coded the behavior of 18 behavior disordered adolescents under three environmental situations using an 11 category system of classification. They found that three stable patterns of responses were identifiable.

Another research strategy has established an intervention oriented approach. For example, Wahler, Sperling, Thomas and Teeter (1970) measured behaviors in two response classes; "mildly deviant behavior" and stuttering. An intervention designed to reduce stuttering also reduced the other problematic behaviors as a collateral effect. Within language research several studies (e.g. Guess & Baer, 1973; Lee, 1981; Whitehurst, 1977) have shown inter-relationships (with some individual differences) between receptive and productive language acquisition. Several studies have found inverse relationships between behavior problems and more situationally appropriate behaviors (e.g. Haring, Breen, Pitts-Conway & Gaylord-Ross, 1984; Koegel & Covert, 1972; Russo, Cataldo, & Cushing, 1981). Although response interrelationships have frequently been documented when multivariate measurement strategies have been utilized, interrelationships are not an inevitable product of behavioral interventions. For example, Neef, Shafer, Egel, Cataldo, and Parrish (1983), demonstrated that compliance training with "do" requests did not generalize to "don't" requests. Given that many studies have found response interrelationships either as directly programmed effects or as unintended effects, the implication can be made that a technology to generate response interrelationships is possible if the variables that control the formation of response-response relationships can be identified and functionally controlled.

While the effects of response interrelationships can be evaluated, there is little data concerning how the response interrelationships were initially formed. It would be useful to know if procedures designed to facilitate acquisition of new response-response relationships could be developed. Research that validated procedures which promote response class relationships would have considerable significance to applied research in that such methods offer the potential to increase the economy of behavioral interventions. Parenthetically, because severely handicapped learners are defined on the basis of educational need (Sontag, Smith & Sailor, 1977), models for the acquisition of new response clusters (e.g. Holvoet, Guess, Mulligan and Brown, 1980) would be more useful than models for changing the frequencies of existing responses.

There has been no research concerning the effects of response interrelationships on stimulus generalization although Casalta (1980) has suggested this possibility. Theoretically, it is possible that if responses are functionally related, the stimulus generalization of one response may mediate the stimulus generalization of another response. For example, suppose that a student has been trained to assemble some product that requires the use of a screwdriver and a wrench at distinct steps of the assembly. Natural variation of both screws and bolts exist to which the student should generalize. Although screwing and bolting responses have some topograghic similarities, there are obvious differences in the responses. If there is a functional relationship between the bolting and the screwing response classes, it is possible that programming to promote the generalization of one response class to its corresponding stimulus class would produce the generalization of the functionally related response class in the absence of direct programming. A model to study some effects of response interrelationships on stimulus generalization will be tested in the present investigation.

The model to be tested in the present study is an extention of the strategy of "training sufficient exemplars" (Stokes & Baer, 1977). Within the present model, stimulus sets; in contrast to individual stimuli, are treated as exemplars of a higher order category. Specifically, a series of S-R relationships are established for a number of responses. Next, training is introduced to promote the generalization of some of the trained responses to their corresponding stimulus sets. As stimulus generalization is sequentially trained across a variety of responses, generalization probes are conducted with the remaining untrained stimulus sets. After some sufficient amount of generalization training, spontaneous generalization of sets of stimuli may occur to their respective response classes. The model can be refered to as "response mediated generalization" because the stimulus generalization of some response(s) mediates the stimulus generalization of functionally related responses to their corresponding sets of stimuli. The model is directly analogous to the training of sufficient exemplars because new sets of stimuli can be progressively layered in until spontaneous generalization occurs between other responses and untrained sets of stimuli.

In the present study, four severely or moderately handicapped children will be trained to play with a variety of toys. Toy play responses were selected to investigate the model because the learning of a diverse set of play responses which are appropriately generalized to a wide variety of toys is recognized as important for students with severe disabilities (Wehman, 1979). In summary, the study has two related purposes. One purpose of the study is to teach the participants some needed toy play responses. In addition, the major purpose is to assess the effects of generalization training across functionally related responses on the subsequent generalization of other related responses.

Method

Participants and Setting

Four children attending classes for moderately and severely handicapped students participated in the study. The participants' classrooms were located in a regular elementary school building and were operated by a public school system. The participants engaged in unstructured toy-play with nonhandicapped children on a regularly scheduled basis. The participants were selected because they displayed low rates of appropriate toy manipulation. Summaries of recent test results and descriptive data are given in Table 1.

Insert table one about here

Mick spoke in two word phrases and could label a large variety of objects. Receptively, he could carry out commands such as "turn off the lights" or "go get a waste basket". Mick had been trained to complete many self care skills; however, he still required instruction in zipping, buttoning and shoe tying. He could learn new responses through imitation.

Charles rarely produced spontaneous speech, although he was capable of labeling responses. Receptively, he responded to two or three word commands such as "look at me" or "go to the door". Charles was not toilet trained and could not chew solid foods. He displayed no imitative responses during instruction.

Jim could follow two or three word commands. He spontaneously greeted familiar people and asked questions such as "what's that?" The maximum length of his utterances was four words long, although he typically spoke in two word utterances. He had been taught to identify several printed words on sight, but demonstrated inconsistent comprehension of sight words. He was capable of learning through imitation.

Jane could independently dress herself. She could respond correctly to two word commands and could label a variety of objects. She knew the names of the five other children in her class. She could produce three word utterances, but she typically spoke one word statements. She had excellent imitative ability.

All training and generalization sessions were conducted in a 6m by 8m office adjoining the participants' special education classrooms. The sessions were conducted at a 1m by 3m table with the instructor seated across the table from the participant. All training and probe sessions were conducted individually. The instructor was a female graduate student in the severely handicapped area at San Francisco State University.

Materials

Each participant was exposed to eight different sets of toys from the following ten sets: animals, people, bugs, frogs, motorcycles, airplanes, boats, snakes, tanks, spaceships. Each set of toys contained five examples. The toys in each set varied in terms of size, color and "abstractness". The range of abstractness within in each toy set was produced by selecting toys such that the toys in the set shared a small set of common configurational properties (see Table 2). The most abstract toy in each set consisted of cut out wood forms with no details other than the defining configurational elements. The other toys in each set were selected to possess the defining properties and progressively more and different details. For example, the most abstract toy airplane consisted of two Lincoln Logs crossed at right angles and attached with Scotch Tape. The least abstract airplane was an accurate 1/100 scale 747 jet.

The sets of toys were divided into three experimental groups. Four sets of toys were designated as generalization training sets. For example, Jane's generalization training sets were snakes, boats, tanks, and people. Another four sets were designated as generalization probe sets. For example, Jane's generalization probe sets were animals, airplanes, bugs, and spaceships. Finally, two sets of toys (wind-ups and keyboard instruments) served as an additional group of generalization probe sets. This second group of generalization probe toys was added to assess the spread of response mediated generalization to sets that required substantially different responses. That is, all other toy sets in the study were played with by physically moving the toy through some pattern of responses. In contrast, both the wind-up toys and tne keyboard instruments produced effects that were more reactive in nature. These toys are refered to as reactive because once a response is made with the object (either winding it up or pressing a key) the object itself produces an effect that is potentially noticable. Since the toy sets of reactive toys produce distinct effects from the other toys, they were analyzed seperately. The sets of reactive toys contained three objects each (only three objects were included in these sets because of difficulty in locating multiple examples of keyboard instruments). Table 2 shows the characteristics of the reactive toys as well as those which required movement responses.

For each participant, the movement related toys were randomly assigned to either the generalization training or generalization probe group of sets. However, the assignment was controlled so that no one toy set was allowed to be used more than twice in either group of toys across the four participants. In addition, if a toy was used once (or twice) in either the generalization probe or training groups it was used once (or twice) in the other group of sets. For example, if frogs had been randomly assigned twice to two participants as a generalization training toy, the frog set would be assigned as a generalization probe set to the two remaining participants. This procedure was followed to ensure that all of the sets were sampled and so that any set appeared an equal number of times in generalization probe and training sets. Table two indicates that the toys were organized into

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Insert table two about here

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sets on the basis of sharing a common set of configurational attributes.

Response Definitions

The responses to be taught were specific to each set of toys. For example, with spaceships the participants were taught to move the toy through the air in a circular motion and land it at a right angle to the table. In contrast, airplanes took off from the table at a lesser angle and flew in straight lines. Thus, the responses for each toy set were differentiated. A summary of toy types and responses is given in Table 3.

Insert table three about here.

Procedures

Baseline probes. The participants received a minimum of two trials with each of the 46 toys to be used during the study. Verbal praise was given during the probes by saying "good working" before the trainer showed the participant a toy. Praise was given during baseline sessions to keep the students level of interest in the task relatively constant throughout the session and to keep the density of praise fairly constant between baseline and training trail (although this was not systematically controlled). Toys were handed to the participant with the instruction, "play with this". The participant was then given 15 sec to play with the toy.

Training with the first examples from the generalization probe sets. Following the baseline probes, the participants were trained to produce the specific responses with the most detailed and realistic toys from each generalization probe set ("first examples"). During this training phase, the participants were also trained to play with one keyboard and one wind-up toy. Each session contained 15 training trials . One session was conducted each school day.

The trials began with the instructor saying "play with this". The instructor then handed the participant the toy and observed whether or not the correct sequence of responses was produced. If within 10 sec the student did produce the correct response pattern, enthusiastic verbal praise was delivered. If the student did not produce the correct pattern, the instructor said "No, do it like this" and simultaneously modelled the correct sequence. If the student then correctly imitated the response, the instructor said "Good" and presented the next toy to be trained. If the participant did not correctly imitate the response, the instructor said "No, do it this way." The instructor then physically guided the responses by placing the participants hand on the toy and guiding the correct movement. No verbal praise or feedback followed manually guided responses. The criterion for ending training with a toy was set at three consecutive correct responses. Training was conducted in a spaced trial format in that maintenance and generalization probe trials with other toys were dispersed between instructional trials. Including training, maintenance and generalization trials, sessions typically lasted 15 min.

Generalization training with movement related toys. After the participants reached criterion with the four first examples from the generalization probe sets, generalization training with other movement related toy sets was begun. A multiple exemplar strategy was employed to promote generalization within the training sets (Stokes & Baer, 1977). The participants were first trained with the most detailed, realistic toy from each set. After the training criterion was met with that toy, the more abstract toys were trained one-by-one until generalization to the remaining untrained toys in the set occurred. The order of introduction of the generalization training sets was randomly determined for each student. The training procedures were identical to those used during the previously described training phase. As during the initial training phase, any unprompted correct response recieved enthusiastic praise.The criterion for switching from one toy set to another was either:

a) when the participant generalized to all remaining toys in a set, or

b) when training was completed with all toys within a set to which the student had not generalized.

Each session lasted 15 minutes and contained 15 training trails.

Generalization probes. The experimental sessions were organized so that probe trials were randomly dispersed between training trials. A maximum of seven toys per day were probed. The probe trials began with the statement, "play with this", as did the training trials; however, during probe trials no prompt or praise was delivered. Generalization probes were conducted with untrained movement related toys as well as with the untrained reactive toys.

Maintenance probes. Each of the four "first example" toys from the movement related sets as well as the two reactive toys which were trained during the first training phase were probed throughout the duration of the study to ensure that the responses were maintained. If the responses were incorrect during a maintenance probe, the correct pattern of behavior was prompted as during the training trials in order to ensure that the responses remained in the participants repertoire of play responses. Correct responses recieved praise from the instructor.

Measurement and Reliability.

The dependent measure during all experimental sessions was the frequency of correct responses for each training or probe toy. A correct response was defined as producing the exact pattern of behavior defined for a given toy within 10 sec of receiving the toy.

Totaled across the four participants, 148 sessions were conducted. Reliability probes were taken 20 times. Reliability probes were conducted under each experimental condition and with each student by the instructor and the author. Each observer independently scored the child's play as to the occurrence or nonoccurrence of the correct pattern of responses for that toy as defined in Table three. The reliability coefficient was calculated with the formula:

$$\%\ \text{interobsever agreement} = \frac{\#\ \text{of agreements}}{\#\ \text{of agreement} + \#\ \text{of disagreements}} \times 100$$

Reliability was calculated on a point-by-point basis (Kazdin, 1982). The session reliability for the occurence of target responses ranged from 82% to 100% with a median of 100%. The session reliability for non-occurences was 100% for all sessions except one session for which the percent agreement was 89%.

Design

A multiple probe design was employed. The multiple probe data was collected within a design that conformed to a multiple baseline across responses design (Hersen & Barlow, 1976; Kratochwill, 1979; Kazdin, 1982). The multiple baseline analysis was conducted during the first training phase of the study. After stable baselines were achieved for the four "first example" toys, one toy was selected for training. When a reliable change in behavior with the first toy was obtained, the same intervention was used to sequentially alter the play behaviors with the remaining toys. Functional control over the play behaviors was inferred when the correct play behaviors occurred only when the training intervention was initiated. A separate multiple baseline analysis was also conducted with the generalization training data.

Results

First Example Training of Toys From Generalization Probe Sets

The percentage of correct play behaviors with the most detailed toys ("first examples") from the four probe toy sets is represented in Figures 1, 2, 3 and 4. The baseline data across the four participants shows that no correct responses were produced. Jane's data (Figure 1) indicated that correct responses with the first example from the animal set were produced during the second training session. After the fifth day of training with the toy animal, training with the first airplane was begun. Intervention with the first example from the toy bug set was started after two days of training with the toy airplane since the change in performance from the baseline level was apparent. Instruction with the first spaceship was begun after two days of instruction with the toy bug. Jane's data show that there was no increase from baseline levels until intervention with a toy was begun. With all four toys, Jane rapidly met the training criterion once the intervention was begun.

Insert Figure 1 about here

The data for Mick are represented in Figure 2. Intervention with the first examples of the toy airplanes and toy animals produced correct responses during the first training session for each toy. Also, for both of those toys, Mick achieved 100% correct responses by the third day of training. In contrast, the initial acquisition of play responses with the toy snake and toy tank was slower. Correct responses were observed on the second and third days of training for the first example of tanks and snakes respectively. Mick achieved 100% correct responding with the most detailed toy snake by the fifth day of training and he achieved 100% correct with the first tank on the fourth day. Thus, for the four first example toys, Mick rapidly acquired the correct play responses when the intervention was introduced .

Insert Figure 2 about here

Jim's data (Figure 3) indicate that the intervention was effective in increasing the level of correct responding across all four representational toys. One hundred percent correct responding was achieved within five days for the toy person, snake and boat and within four days with the toy motorcycle. The data for the toy person show that when training began with the toy snake, the performance dropped to zero percent with the toy person. On the day that training was begun with the toy snake, only one maintenance probe trial was run with the toy person. During that trial, the correct responses with the toy person were again prompted and praised which produced maintenance of the responses for the duration of the study.

Insert Figure 3 about here

The data for Charles (Figure 4) show that acquisition of the play responses with the spaceship was initially slow; however, it should be recalled that Charles did not imitate prior to the study. On the sixth day of intervention, correct responses were first produced and an upward trend towards the training criterion was evident. In contrast to the data for the first toy, the correct responses across the toy frog, person and boat were observed within two days of the introduction of the training procedure. Interestingly, as with Jim's data, a brief decrease in performance (i.e. incorrect responses on three consecutive trials) was observed when training with the second toy was begun. In fact, immediately after training with the frog was introduced, Charles attempted to produce the frog responses with the spaceship.

Insert Figure 4 about here

In summary, the baseline data indicated that the patterns of responses to be trained were not produced. Across the four participants, once the training procedures were introduced, correct responses were observed and the training criterion was rapidly met.

Within Stimulus Set Generalization Training

After the participants had acquired the specific responses taught to the four first example toys from the generalization probe sets, generalization training was begun. Generalization training was conducted with four sets of toys with each participant. The students were trained to play with progressively more abstract toys from each generalization training set until generalization or training had occured to all toys from a set. Table 4 summarizes the number of exemplars that required training from each set of toys across the participants. In general summary, the first two sets required more exemplars trained than did subsequent sets. For Charles, Jim, and Mick, only one exemplar required training within the last two sets.

Insert Table 4 about here

The generalization training data for Mick are represented in Figures 5, 6, 7 and 8. Mick's data have been selected for presentation because his performance was representative of the other participants. Figure 5 shows the first set of toys (boats) that recieved multiple exemplar generalization training. The data shows that after training had begun with the first three exemplars, generalization occurred to the fourth example. Altogether, four out of the five boats were trained.

Insert Figure 5 about here

Figure 6 shows the results of generalization training with the second set of toys; spaceships. After training was begun with the first two spaceships, generalization occurred to the third spaceship. The fourth and fifth spaceships required training.

Insert Figure 6 about here

Mick's third set of generalization training toys was toy bugs. After training had begun with the first toy bug, generalization occurred to the remaining untrained bugs.

Insert Figure 7 about here

Figure 8 shows the results of generalization training with the fourth set of toys; people. As with the third set, generalization was observed to four toys after training had begun with the first toy from the set. Altogther, Mick required training with ten different toys across the four sets of toys.

Insert Figure 8 about here

The Functional Control of Between Stimulus Set Generalization By Within Stimulus Set Generalization

Figure 9 shows the effects of generalization training across four sets of toys on the subsequent generalization of the untrained toys from the four sets to which only the first example had been trained. Within Figure 9, the graphs that are inset to the right show the cumulative generalization of play responses to toys within the generalization training sets. The longer graphs underneath each inset graph show the cumulative generalization of the untrained toys from the generalization probe sets.

Mick's data indicated that between set generalization (ie. generalization to the untrained toys from sets from which only the first example was trained) did not begin until generalization training had proceded within the second set of toys during generalization training. Between stimulus set generalization occurred rapidly as generalization training proceded through the third and fourth sets of toys. By the end of within set generalization training, Mick had spontaneously generalized to all 16 of the untrained generalization probe toys.

The data for Charles are represented in Figure 9 immediately below Mick's data. The inset graph shows that Charles generalized to 14 toys across the four sets of generalization training toys. The lower graph for Charles shows that between stimulus set generalization occurred with one toy on the last day of training of the first set of within stimulus set generalization training toys. As training progressed through second and third sets Charles generalized to progressively more toys. By the end of training Charles had generalized to nine toys from the sets to which only the first example had been trained.

Jane's data (located under the data for Charles) indicates that within stimulus set generalization training produced generalization to ten toys across the four sets. Between stimulus set generalization began during generalization training within the second set of toys. As generalization training proceded through the second, third, and fourth sets; Jane progressively generalized to more toys from the probe sets. By the end of training, between stimulus set generalization had occurred to 13 of the 16 untrained toys from the generalization probe sets.

Jim's data is represented in the bottom set of graphs in Figure 9. During training within the first two sets of toys Jim produced fewer generalized responses than did the other three participants; however, Jim did generalize to the maximum possible number of toys within the third and fourth sets. Jim's between set generalization data shows that he generalized to three toys prior to the onset of generalization training. These three toys and the one toy that Jim generalized to during the first training set were the untrained toy people. It should be recalled that the first toy that Jim was trained with was the first example of toy people (the set included a small "star wars" android figure, a troll doll, a gumby, a male doll dressed in conventional clothing and a cut-out wood figure). After Jim had been prompted to produce the people response following the introduction of the second first example toy, he generalized the people response not only to the remaining toy people but at least once to every untrained toy in the study (with exception of the full sized piano). Although Jim's data indicate that generalization occurred prior to the onset of generalization training, those generalized responses represent a nondifferentiated form of generalization because Jim was not discriminating people from nonpeople when producing the response. Thus, with the exception of the toy people, Jim followed a similar pattern to the other participants in that between set generalization did not occur until within stimulus set generalization training had progressed to the second set. Altogether, Jim showed between stimulus set generalization to seven toys (11 if people are included as they are in Figure 9).

All of the participants demonstrated some degree of between stimulus set generalization. Between stimulus set generalization appeared to be under control of within stimulus set generalization (with the exception of Jim's people). For Mick, Jane and Jim, generalization training within two sets was associated with the beginning of between stimulus set generalization. Even though Charles began to show between stimulus set generalization during the first generalization training set, his maximum rate of between stimulus set generalization occurred during the second generalization training set.

Patterns of Between Stimulus Set Generalization

Figures 10, 11, 12, and 13 show the pattern of generalization to untrained toys across the four participants. Within the figures, the numbers 2 through 5 designate the toy which was probed on a given day from the generalization probe set. The toys were numbered from two through five, with five being the most abstract toy within each set.

After Jane (Figure 10) had been trained to generalize to the set of toy snakes (which required training with four examples), generalization training with toy boats was begun. During generalization training with boats, she generalized to the second toy animal and the third airplane examples.

Generalization to the remaining airplanes, bugs and animals and to one spaceship occurred after generalization training had proceeded to toy tanks and to toy people.

Insert Figure 10 about here

The data for Mick (Figure 11) show that after training occurred with four examples from the set of toy boats (1,2,3 and 5) and four examples of spaceships (1,2,4 and 5), generalization first occurred to airplanes (2 and 3) and animals (2 and 5). By the time that generalization training had proceeded to the toy bugs (only the first example required training) and the set of people (only the first example required training), Mick generalized to the remaining airplanes and animals as well as to the sets of snakes and tanks.

Insert figure 11 about here

Jim's data (figure 12) show that generalization to toy people occurred prior to the initiation of generalization training. As stated previously , probes with other untrained toys showed that Jim had transferred the people response to nearly all of the toys within the sets. As training proceeded sequentially to the first examples of the snake, boat, and motorcycle, Jim would learn the new differentiated responses as they were introduced with the specific toy taught, yet would continue to produce the people response with the untrained toys from those sets. When within stimulus set generalization training was initiated, generalized responses to the snakes and motorcycles first appeared after generalization training had been conducted with toy spaceships (which required training with four examples) and with two examples from the set of toy airplanes (which eventually required training with all five examples). Jim continued to produce the people movement responses with all of the untrained toy boats throughout the duration of the study. In total, Jim displayed between stimulus set generalization with seven toys from the snake and motorcycle sets.

Insert Figure 12 about here

The graph of Charles' data (Figure 13) indicates that generalization occurred to all of the untrained toy frogs and people and to one of the toy boats after he had been trained to generalize to the sets of toy animals (trained with two examples) and airplanes (trained with two examples). Generalization was not observed to any spaceship.

Insert figure 13 about here

In total, the four participants were probed with 16 sets of toys to which only the first example from the sets had been taught. At least partial generalization was observed to 13 of those sets. The sets of boats and spaceships accounted for most incorrect responses. Most of the errors when playing with spaceships were the result of substituting the airplane responses for the spaceship responses. When playing with boats, Jim consistently substituted the people responses for the boat responses. While Charles did respond to one untrained boat correctly, he did not substitute other toy play responses with the remaining boats. Instead, he usually held the boats and slid them along the table without producing the necessary differentiating behaviors.

Generalization Probes with Reactive Toys

The acquisition, maintenance,and probe data with the sets of reactive toys are represented in Figure 14. The generalization probes with the untrained toys from the those sets are represented in the figure by the numbers 2 and 3 which correspond to the two untrained toys from the sets. These data show that although the participants acquired and maintained the play responses with the first examples from the sets, generalization did not occur to the untrained toys.

Insert Figure 14 about here

Discussion

The results indicated that when generalization training had proceeded to a sufficient number of sets of toys, there was an associated facilitation of generalization to other untrained sets of toys. Although the degree of generalization observed was impressive, there was little or no generalization to two sets of movement related toys (boats and spaceships). With the exception of one of Jim's toy sets, the occurrence of between stimulus set generalization was dependent on exposure to within stimulus set generalization training. Maximal between stimulus set generalization occurred upon introduction of the second set of toys during generalization training.

Importantly, generalization was not observed to the toys from the sets of reactive toys. The failure to generalize to the reactive toys could be due to several possible factors; the discrimination of the defining properties of the reactive toys may have been more difficult, the students may have had fewer real life experiences or histories of play with toys similar to those from the reactive sets, or a lack of some critical relationship to the other toy sets may have been responsible. The characteristics of stimuli or responses that control the spread of between stimulus set generalization warrent further discussion and experimentation. In the present investigation, the movement related toys required similar response topographies (eg. holding the toys and moving them in similar patterns). Thus it is possible that similarities in response topographies controls response mediated generalization. It is also possible that similarities in the features that require discrimination may control between stimulus set generalization. Finally, similarities or differences in effects may exert control. In the present study, the reactive toys differed from the movement related toys on at least two of these dimensions; topographies and effects.

For a clearer interpretation of these data it would be important to show that discrimination of the defining attributes of each set was of comparable difficulty across the sets of movement related and reactive toys. Although the sets were constructed so that at a subjective level the discriminations required seemed to be of comparable difficulty, the study does not provide an empirical demonstration of the similarity. A partial control for this problem was provided by including a wide range of objects within each set, so as to produce a realistic range in difficulty of determining whether or not a given toy was an example of a set. When the participants did generalize to a set, they generalized to the full range of toys within the set with only three exceptions (Jane's spaceships; Charles' boats; and Jim's motorcycles), In addition, the participants did not generalize to the untrained reactive toys even though the toys were quite similar in some cases (e.g. the full size piano and the smaller plastic piano). This suggests, though only circumstantially, that it was not simply the difficulty of classifying the toys or discriminating the controlling properties which accounted for the between stimulus set generalization observed and the lack of generalization to the reactive toys. If this argument can be made more convincing (with additional studies in the future), these data may indicate that if generalization is an operant which can be trained as Parsonson and Baer (1978) suggested, the parameters which control a generalization operant, may be relatively specific to the task, materials or context within which the responses were trained and probed.

It should be stressed that the findings of the present study are preliminary and that there is a lack of comparable research concerning response mediated generalization which could aid intrepretation of these data. The inference that response-response relationships were responsible for the generalization observed, or even that response mediated generalization exists as a phenomenon is premature. The study showed that a package of treatment strategies; multiple exemplar generalization training, the organization of training so that potentially related responses are trained in close temporal proximity, reinforcement for generalizing responses during training, and grading the objects into ranges of color, size, and abstractness, was associated with the observed degree of generalization.

Explanations of the formation of response-response relationships usually concern either a) the close temporal occurrence of responses, b) the functional similarity of the responses in producing some effect and/or c) similar antecedent, controlling variables. The present study suggests that it may be useful to investigate the formation of response interrelationships with a finer grained analysis in order to identify stimulus and response related features which may control generalization.

The training procedure was effective in teaching the participants independent play skills which they formerly lacked. The play skills taught were selected on the basis of observing the natural play of nonhandicapped students in free, parallel play situations. In such situations, children typically play with a number of different toys and in fact often play with toys they have just observed other children manipulating. Thus, the wide variety of toys to which the children could produce age appropriate, normalized responses was greatly increased as a result of the study. It should be pointed out that normalized responses in play situations may be a significant vehicle for the social integration of children with moderate and severe handicaps. As such, future investigations of training procedures designed to promote parallel play behaviors should include not only procedures designed to promote play with large numbers of commonly available toys, but should include social validity evaluations of the subsequent play responses by nonhandicapped peers.

In conclusion, the present study proposes a training strategy based on the theoretical influence of response interrelationships on stimulus generalization. It is apparant that there are a number of ways in which responses can form interrelationships and there are multiple effects that such relationships may exert on the learning, performance and generalization of responses. It is hoped that continued research in this relatively new area of investigation will lead to increased efficiency of instructional programs without concomitant increases in the complexity of instructional technology.

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Table One

Descriptive Characteristics of Students

Participant	Age	Primary Handicapping Condition	IQ Estimate (Stanford Binet form L-M)	MEAN Performance across subscales of AAMD Adaptive Behavior Scale (TMR Norms)
Mick	7 yrs, 10 mos	Severely Handicapped, Down syndrome	37	50th percentile
Charles	7 yrs, 5 mos	Severely Handicapped, Down syndrome	25	22nd percentile
Jim	4 yrs 2 mos	Moderately Handicapped	50	65th percentile
Jane	4 yrs 6 mos	Moderately Handicapped, Down syndrome	50	70th percentile

Table 2

The Sequence of Addition of Details to Toys

And The Characteristics of the Reactive Toys

Toy Set	Defining Properties	Sequence of Additional Details
Movement Toys		
Airplanes	Fuselage cylindrically shaped and rounded wing surfaces	1. windows, markings, engines, wheels, surface detail, cockpit, tail 2. windows, markigns, engines, wheels, surface detail 3. windows, markings, engines 4. windows 5. abstract shape, just defining properties
Boats	Rectangular section with triangular, boat shaped front surface	1. markings, engine, rudder, cabin, surface detail 2. markings, engine, rudder, cabin 3. markings, engine, rudder 4. markings 5. abstract shape, just defining properties
Snakes	Cylindrical shape	1. tongue, body segments, teeth, bodybumps, eyes, mouth 2. tongue, body segments, teeth, bodybumps, eyes 3. tongue, body segments, teeth, bodybumps 4. tongue, body segments 5. abstract shape, just defining properties
Tanks	Rectangular shape with segmented treads on lower surface	1. bogies, body detail, exterior top shape, turret detail, gun 2. bogies, body detail, exterior top shape, turret detail 3. bogies, body detail, exterior shape 4. bogies, body detail 5. abstract shape, just defining properties

Space ships	Cylindrical engine shapes attached to cylindrical fuselage	1. engine details, body details, cockpit, landing feet 2. engine details, body details, cockpit 3. engine detials, body details 4. engine details 5. abstract shape, just defining properties
Animals	Cylindriacl body shape with four legs and offset rectangle on top of body to simulate a head	1. eyes, mouth, feet, ears, tail, leg details, fur, foot details 2. eyes, mouth, feet, ears, tail, leg details 3. eyes, mouth, feet, ears, tail 4. eyes, mouth, feet 5. abstract shape, just defining properties
Motorcycles	Two circular solid surfaces attached to rectangular shape	1. seat, wheel details, handle bars, spokes, color details, suspension 2. seat, wheel details, handle bars, spokes, color details, 3. seat, wheel details, handle bars 4. seat, wheel details 5. abstract shape, just defining properties
Bugs	Long, thin, pointed body with six legs	1. tail, head, face detail, color detail, wing detail, eyes, feet 2. tail, head, face detail, color detail, wing detail 3. tail, head, face detail 4. tail 5. abstract shape, no details, cylindrical body, six cylindrical legs
Frogs	Rectangular body with bent back lets and	1. feet, head shape, arm shape, body detail, eyes, mouth 2. feet, head shape, arm shape, 3. feet, head shape, arm shape 4. feet, head shape 5. abstract shape, just defining properites
People	Square head, rectangular body with rectangular arms and legs	1. hands, eyes, face details, body details, clothing details 2. hands, eyes, face details, body details 3. hands, eyes, face details 4. hands, eyes 5. abstract shape, just defining properties

<u>Reactive Toys</u>

Wind-ups	1. toy drill 2. toy bear 3. toy car
Keyboard instruments	1. small plastic piano 2. magic flute (an electronic toy that was a long plastic rod with colored keys) 3. a full size piano

Table 3

Response Definitions

Toy Type	Response
Movement Toys	
Airplanes	hold plane, move plane through the air at angles less than 90 , land at angles less than 90
Spaceships	hold spaceship, move spaceship in circular pattern, land spaceship at 90 angle
Boats	hold boat by its top, move on the floor, pitching nose of boat up and down
Tanks	hold tank by its top, move slowly in a staraight line, then make a sharp 90 turn
Animals	hold animal by its top, move on the floor, move back and forth while in motion to simulate movement of limbs
People	hold doll by back or front, move side to side during motion to simulate walking
Bugs or Frogs	hop or jump toys in a straight line
Snakes	move toy side to side while in forward motion to produce a sign wave-like movement
Motorcycles	grasp by top, move in straight line and raise front end while moving at least 6 inches to simulate a "wheelie"
Reactive Toys	
Wind-ups	observe toy to find round key, rotate key until resistance is felt, place on table and observe
Music Toys	produce the sequence of notes by pressing keys starting with middle key followed by the next two adjacent keys (e.g. the notes C, D, E).

Table 4

Numbers of Exemplars Requiring Training as a Function of the Number of Stimulus Sets Taught

PARTICIPANT	SET 1	SET 2	SET 3	SET 4
Jane	3	3	2	2
Jim	4	5	1	1
Charles	2	2	1	1
Mick	4	4	1	1
Means	3.25	3.5	1.25	1.25

Figure Captions

Figure 1. Percent correct toy play responses during baseline, training and maintenance conditions for Jane.

Figure 2. Percent correct toy play responses during baseline, training and maintenance conditions for Mick.

Figure 3. Percent correct toy play responses during baseline, training and maintenance conditions for Jim.

Figure 4. Percent correct toy play responses during baseline, training and maintenance conditions for Charles.

Figure 5. Results of within stimulus set generalization training on Mick's first set of toys: Boats. The asterisk and dashed line indicate that spontaneous generalization occurred.

Figure 6. Results of within stimulus set generalization training on Mick's second set of toys: spaceships. The asterisk and dashed line indicate that spontaneous generalization occured.

Figure 7. Results of within stimulus set generalization training on Mick's third set of toys: bugs. The asterisk and dashed line indicate that spontaneous generalization occurred.

Figure 8. Results of within stimulus set generalization training on Mick's fourth set of toys: people. The asterisk and dashed line indicate that spontaneous generalization occurred.

Figure 9. Cumulative generalization within stimulus sets and between stimulus sets across the four participants. On the inset upper graph for each participant, the cumulative generalization to toys within each training set is displayed. On the lower graph for each participant, unreinforced probes for between stimulus set generalization during baseline, first exemplar training, maintenance trials and within stimulus set generalization training.

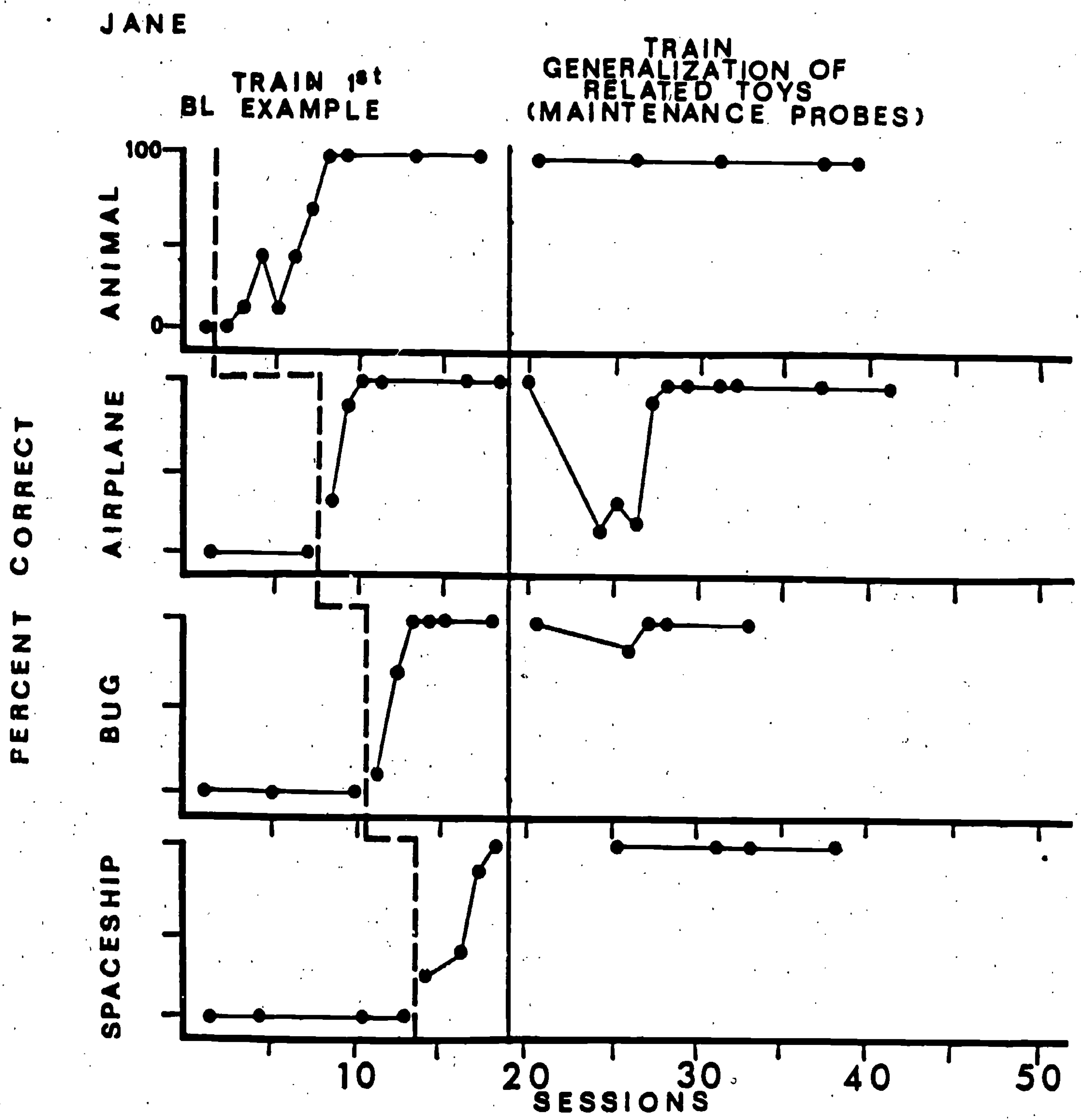
Figure 10. The occurrence or nonoccurrence of Jane's generalized play responses across sets of animals, airplanes, bugs and spaceships during conditions: training to play with the first examples from the sets and generalization training with movement related sets. (The numbers 2, 3, 4, 5 designate specific toys in each set).

Figure 11. The occurrence or nonoccurrence of Mick's generalized play responses across sets of airplanes, animals, snakes and tanks during conditions: training to play with the first examples from the sets and generalization training with movement related sets. (The numbers 2, 3, 4, 5 designate specific toys in each set).

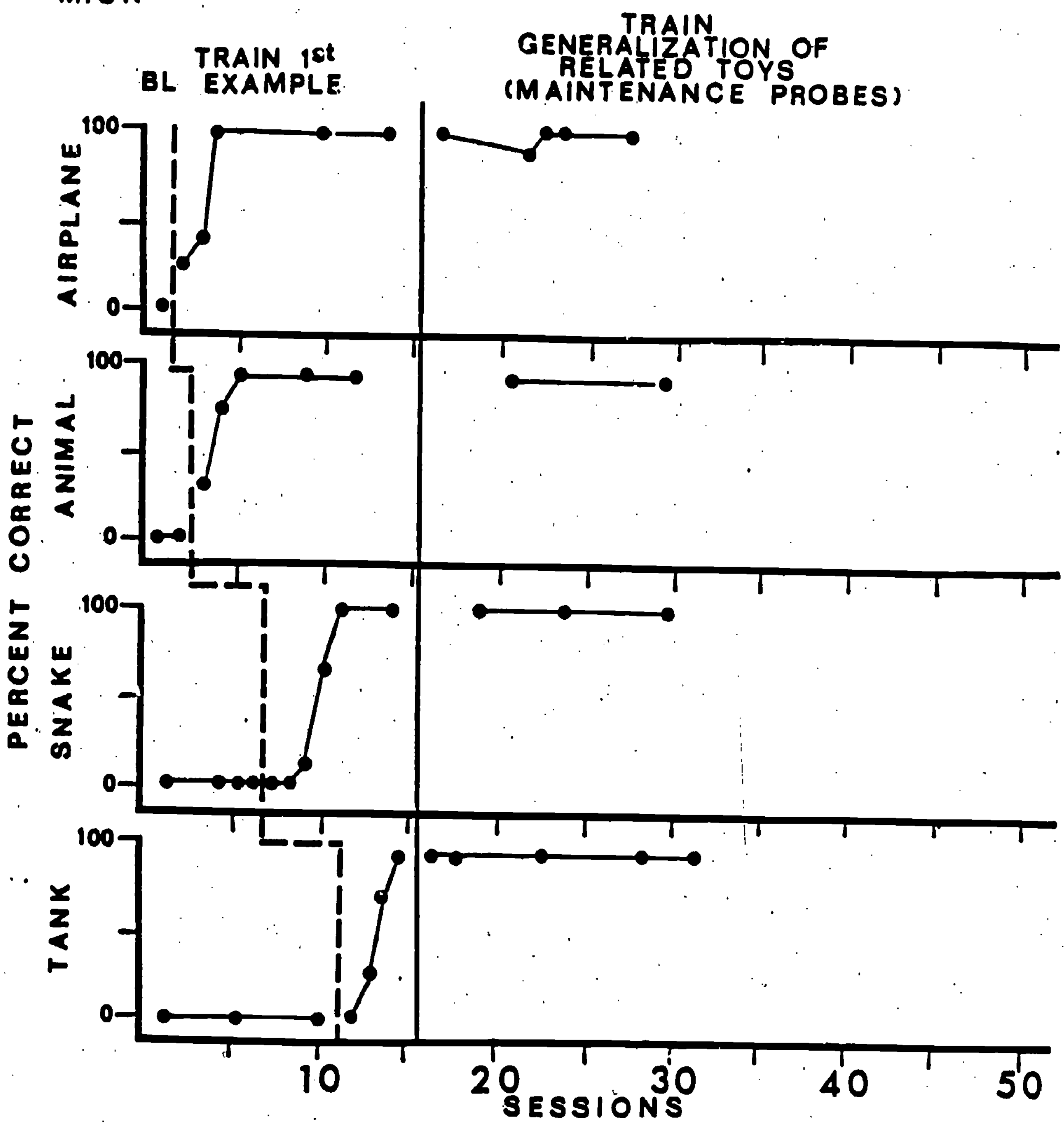
Figure 12. The occurrence or nonoccurrence of Jim's generalized play responses across sets of people, snakes, boats, and motorcycles during conditions: training to play with the first examples from the sets and generalization training with movement related sets. (The numbers 2, 3, 4, 5 designate specific toys in each set).

Figure 13. The occurrence or nonoccurrence of Charles' generalized play responses across sets of spaceships, frogs, people and boats during conditions: training to play with the first examples from the sets and generalization training with movement related sets. (The numbers 2, 3, 4, 5 designate specific toys in each set).

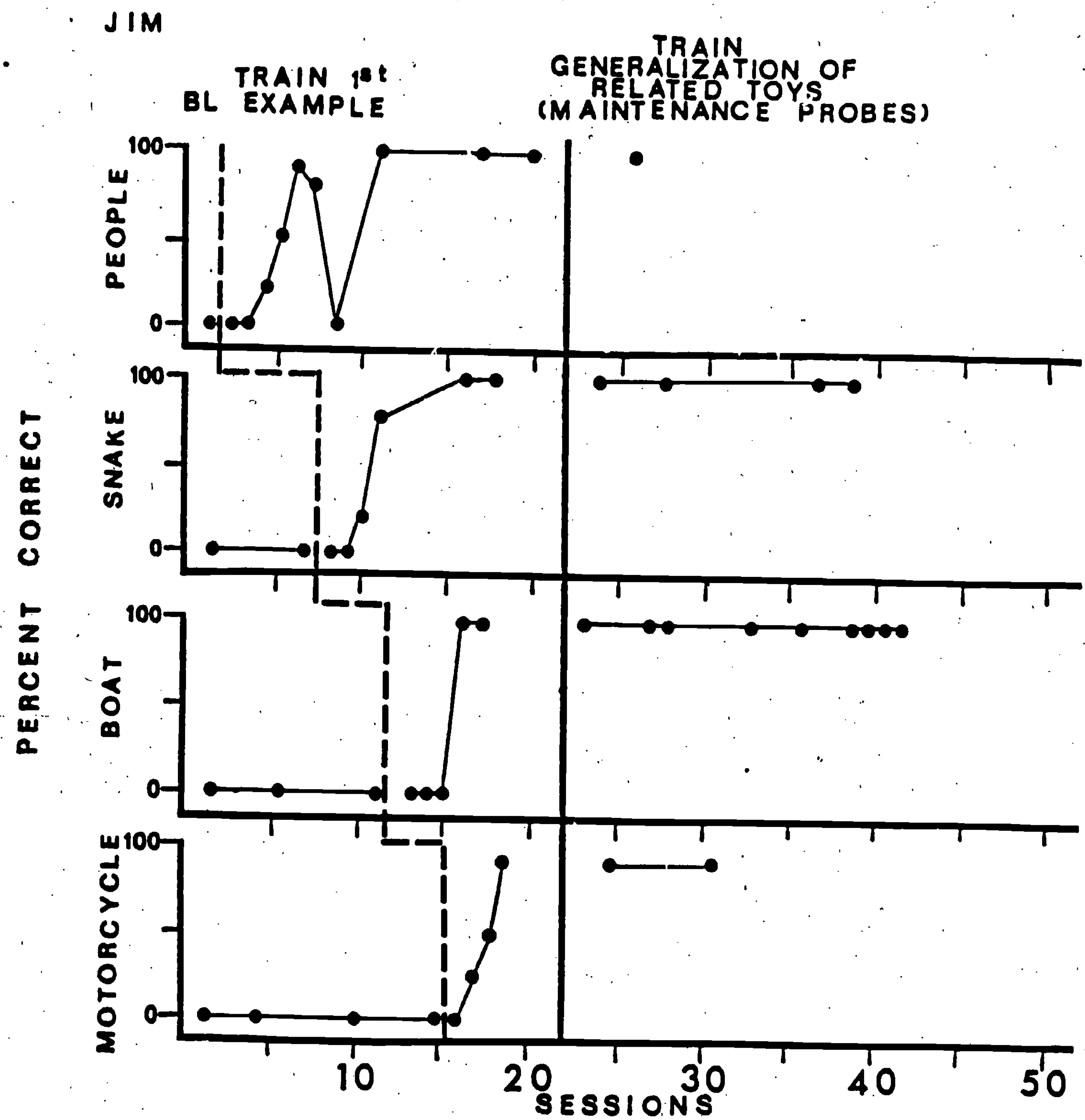
Figure 14. Results of training and generalization trials with reactive toys for James, Mick, Charles and Jim. (The dots represent the percent age of correct training trials with the first examples from the sets. The numbers 2 and 3 designate the other two toys in each reactive set which were probed.)

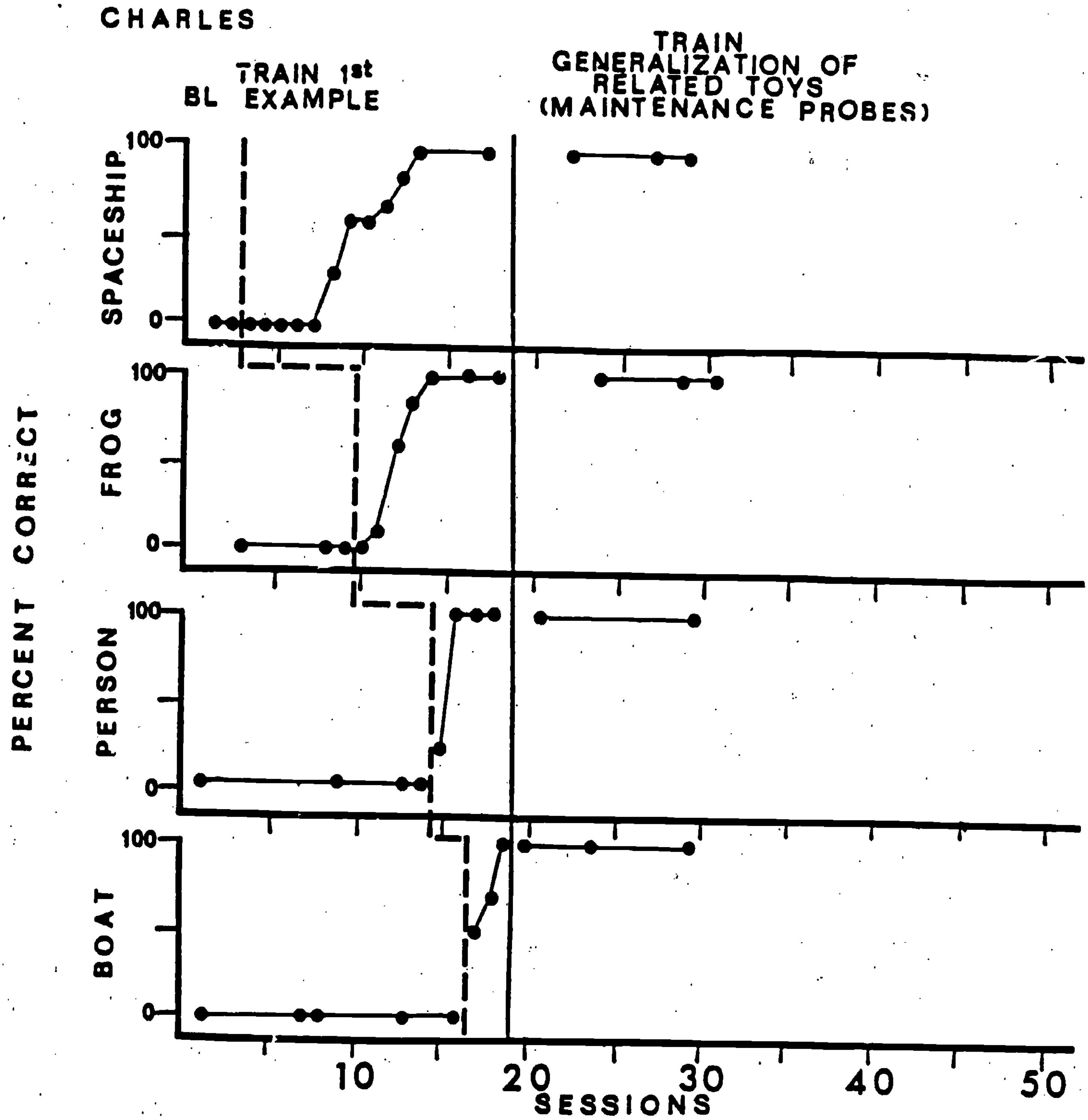

JANE
BL
TRAIN 1st EXAMPLE
TRAIN GENERALIZATION OF RELATED TOYS (MAINTENANCE PROBES)
100
0
ANIMAL
AIRPLANE
BUG
SPACESHIP
PERCENT CORRECT
10
20
30
40
50
SESSIONS

MICK

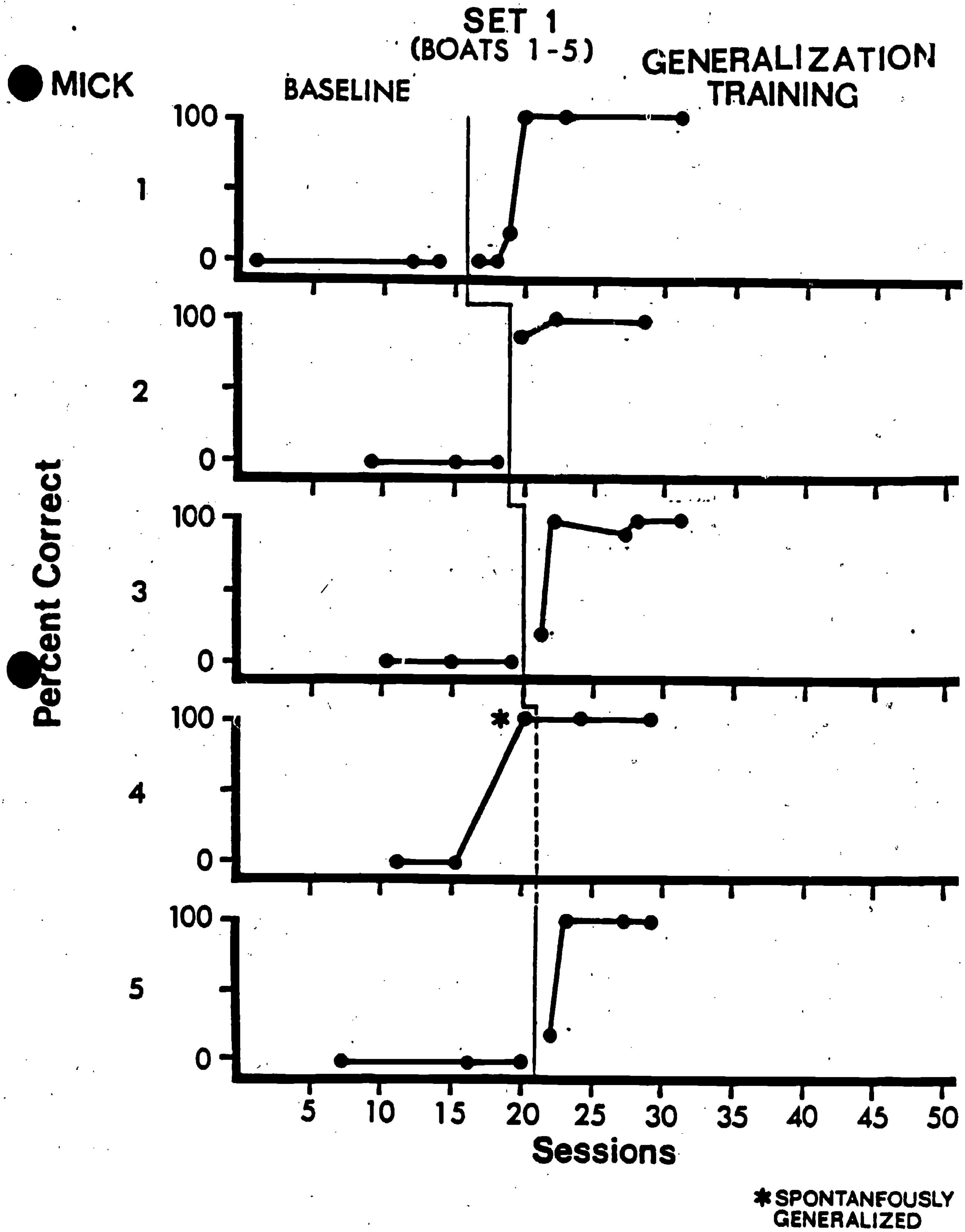


BL
TRAIN 1st EXAMPLE
TRAIN GENERALIZATION OF RELATED TOYS (MAINTENANCE PROBES)
PERCENT CORRECT
AIRPLANE
ANIMAL
SNAKE
TANK
100
0
10
20
30
40
50
SESSIONS

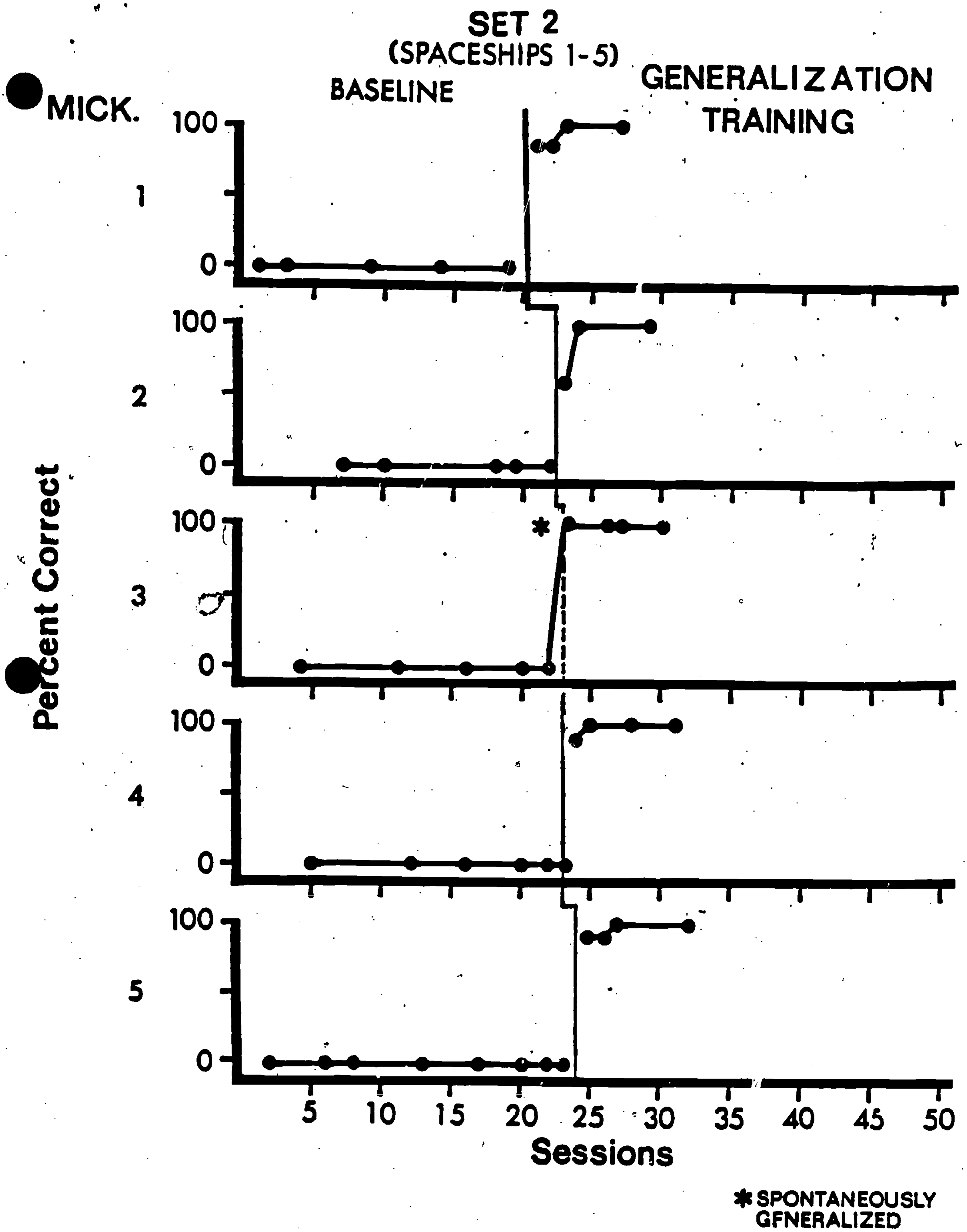

JIM
TRAIN 1st
BL EXAMPLE
TRAIN
GENERALIZATION OF
RELATED TOYS
(MAINTENANCE PROBES)
PERCENT CORRECT
PEOPLE
SNAKE
BOAT
MOTORCYCLE
100
0
10
20
30
40
50
SESSIONS

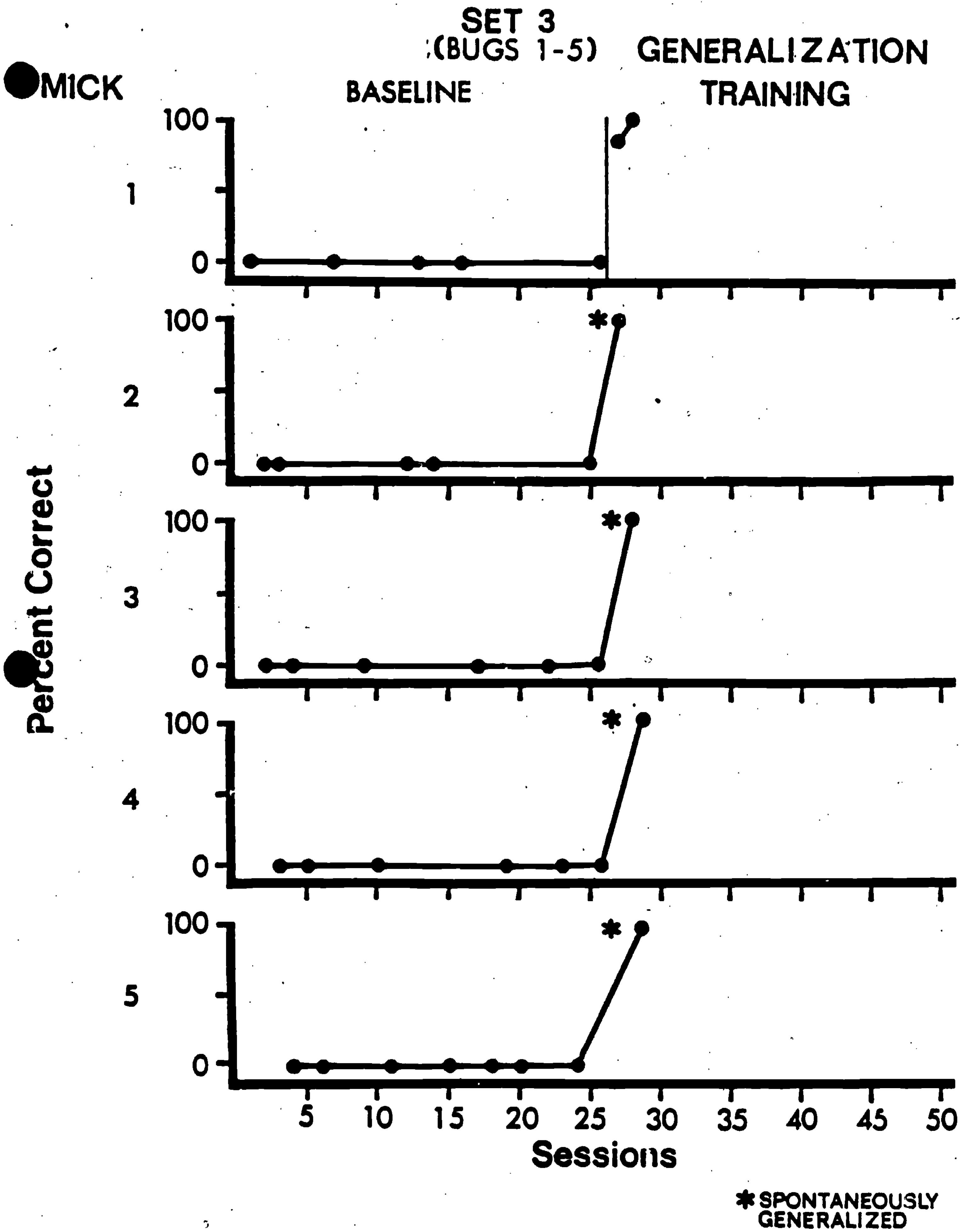


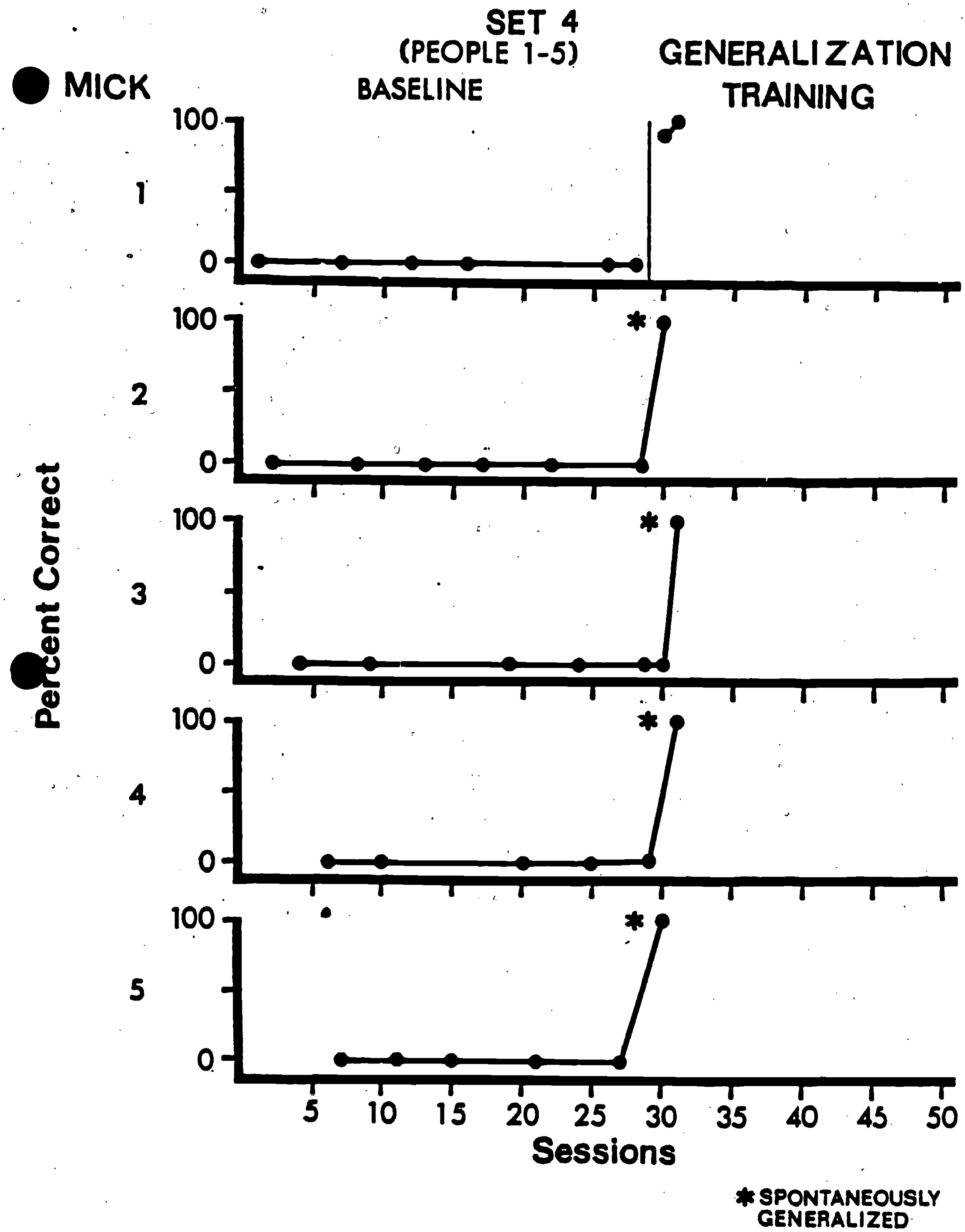
CHARLES
BL
TRAIN 1st EXAMPLE
TRAIN GENERALIZATION OF RELATED TOYS
(MAINTENANCE PROBES)
PERCENT CORRECT
SPACESHIP
FROG
PERSON
BOAT
100
0
10
20
30
40
50
SESSIONS

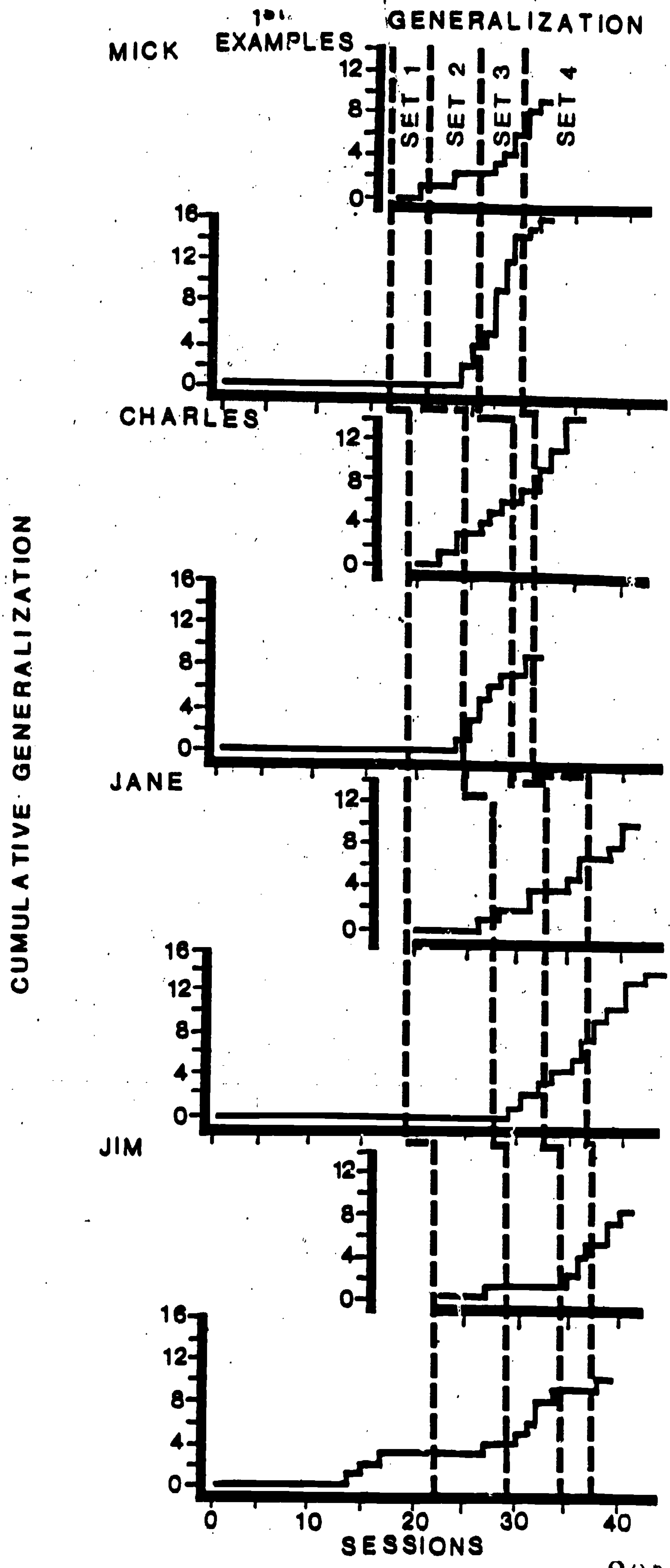


MICK
SET 1
(BOATS 1-5)
BASELINE
GENERALIZATION
TRAINING
Percent Correct
100
0
1
2
3
4
5
Sessions
5
10
15
20
25
30
35
40
45
50
* SPONTANFOUSLY
GENERALIZED

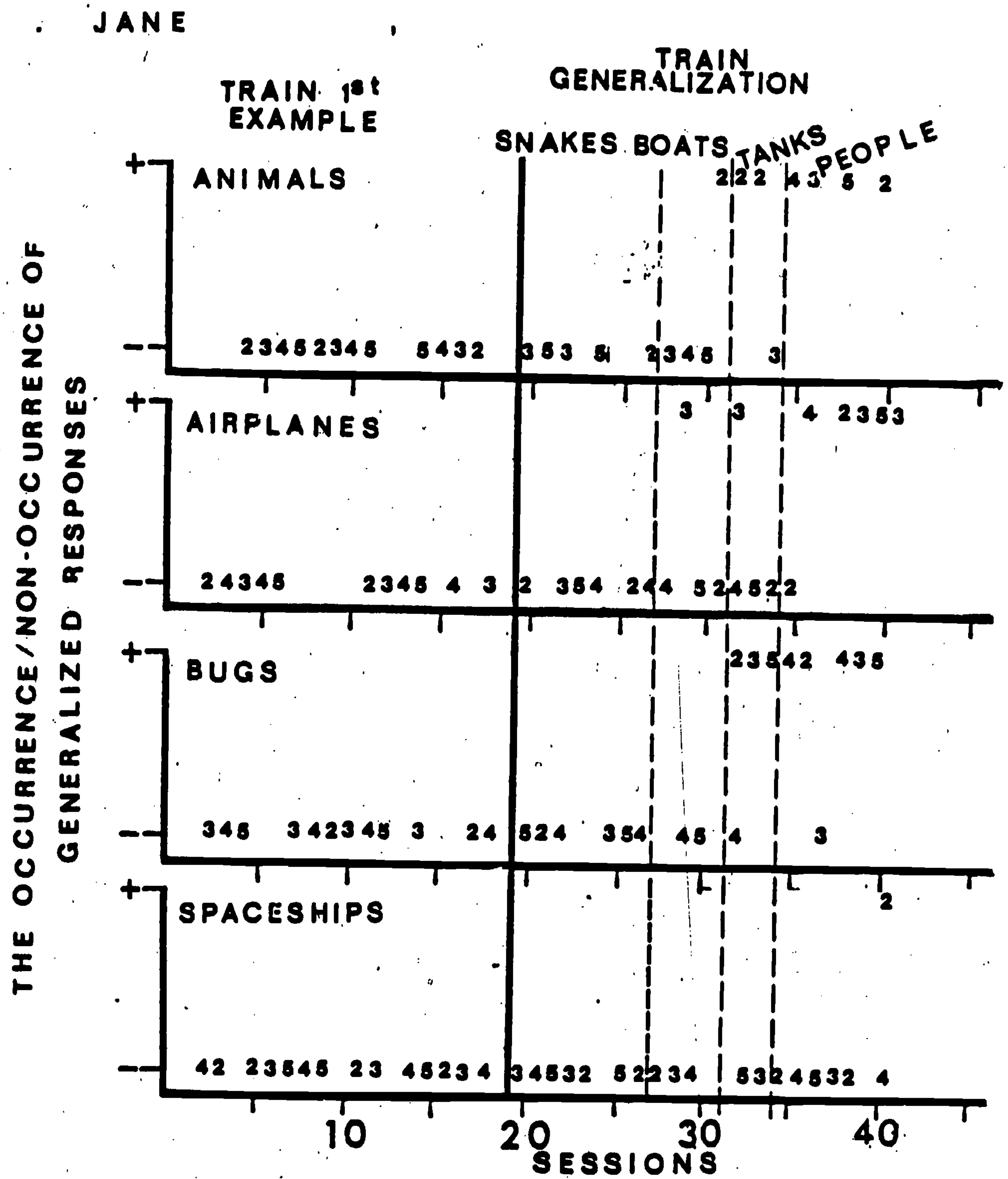

SET 2
(SPACESHIPS 1-5)
BASELINE
GENERALIZATION
TRAINING
MICK.
Percent Correct
100
0
1
2
3
4
5
5
10
15
20
25
30
35
40
45
50
Sessions
* SPONTANEOUSLY
GFNERALIZED


SET 3
(BUGS 1-5)
MICK
BASELINE
GENERALIZATION TRAINING
Percent Correct
100
0
1
2
3
4
5
5 10 15 20 25 30 35 40 45 50
Sessions
* SPONTANEOUSLY GENERALIZED

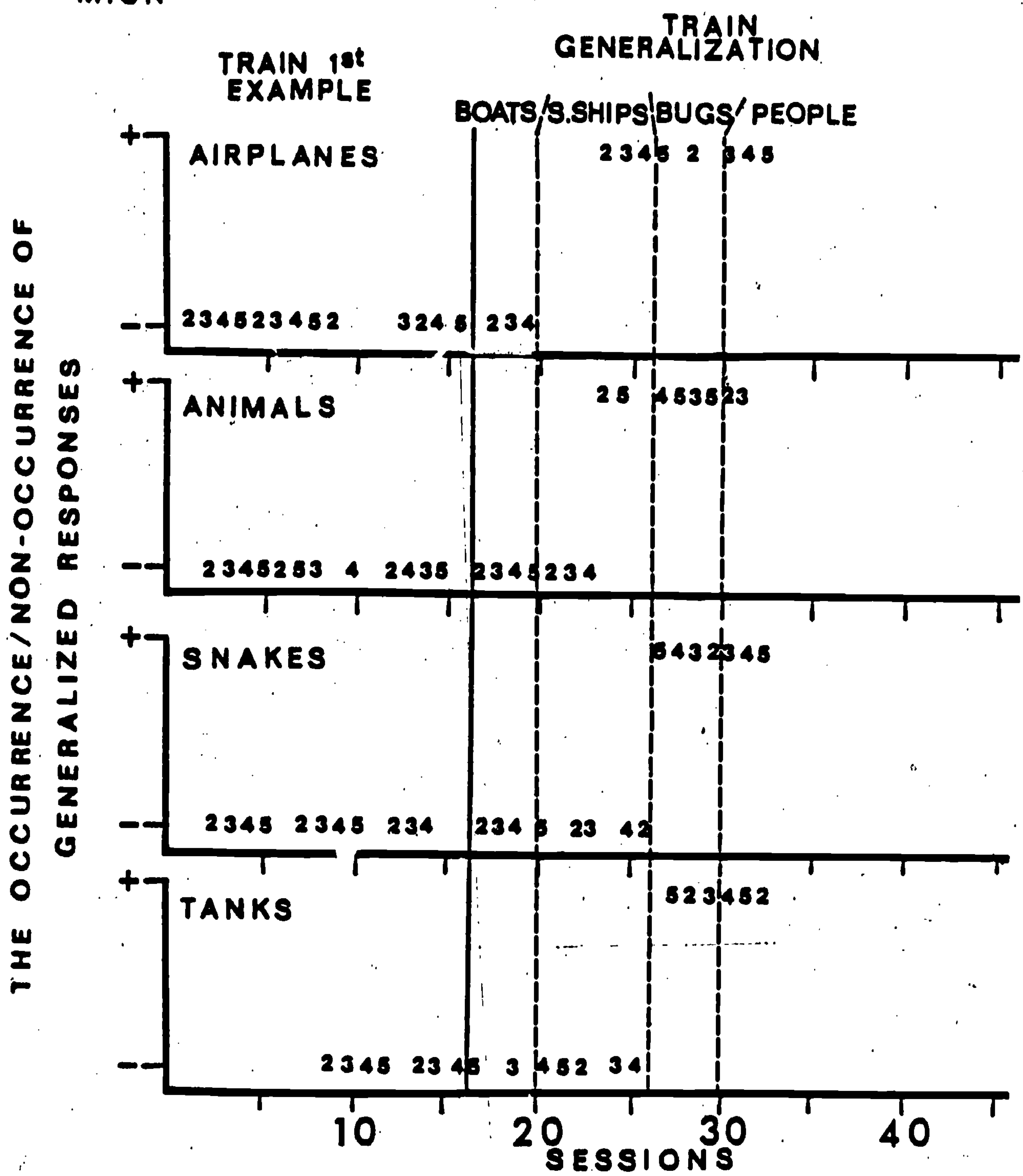

SET 4
(PEOPLE 1-5)
MICK
BASELINE
GENERALIZATION
TRAINING
Percent Correct
100
0
1
2
3
4
5
5
10
15
20
25
30
35
40
45
50
Sessions
* SPONTANEOUSLY GENERALIZED



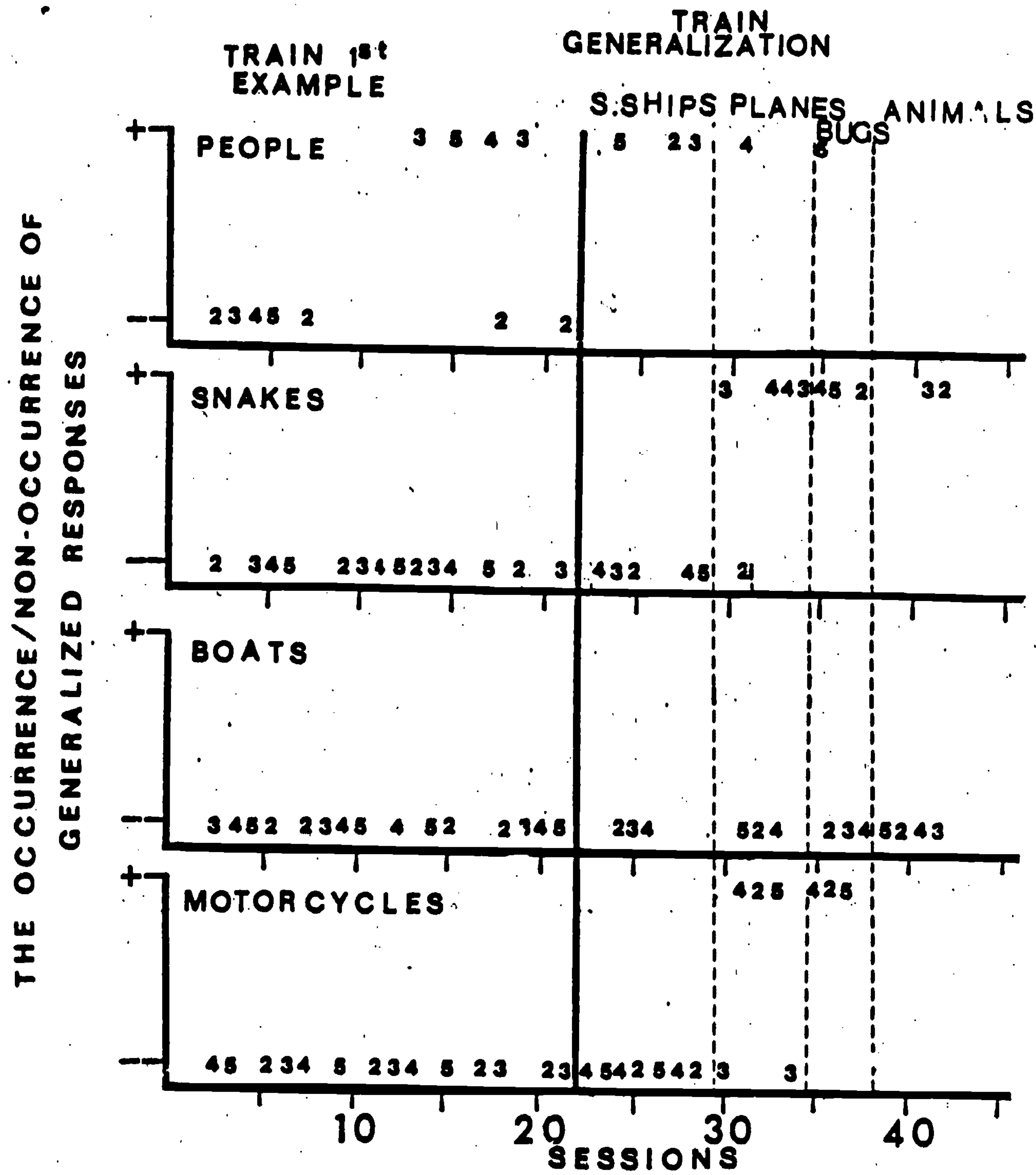
1st EXAMPLES
GENERALIZATION
MICK
SET 1
SET 2
SET 3
SET 4
CHARLES
JANE
JIM
CUMULATIVE GENERALIZATION
SESSIONS


JANE
TRAIN 1st EXAMPLE
TRAIN GENERALIZATION
SNAKES
BOATS
TANKS
PEOPLE
ANIMALS
AIRPLANES
BUGS
SPACESHIPS
THE OCCURRENCE/NON-OCCURENCE OF GENERALIZED RESPONSES
SESSIONS
10
20
30
40

MICK

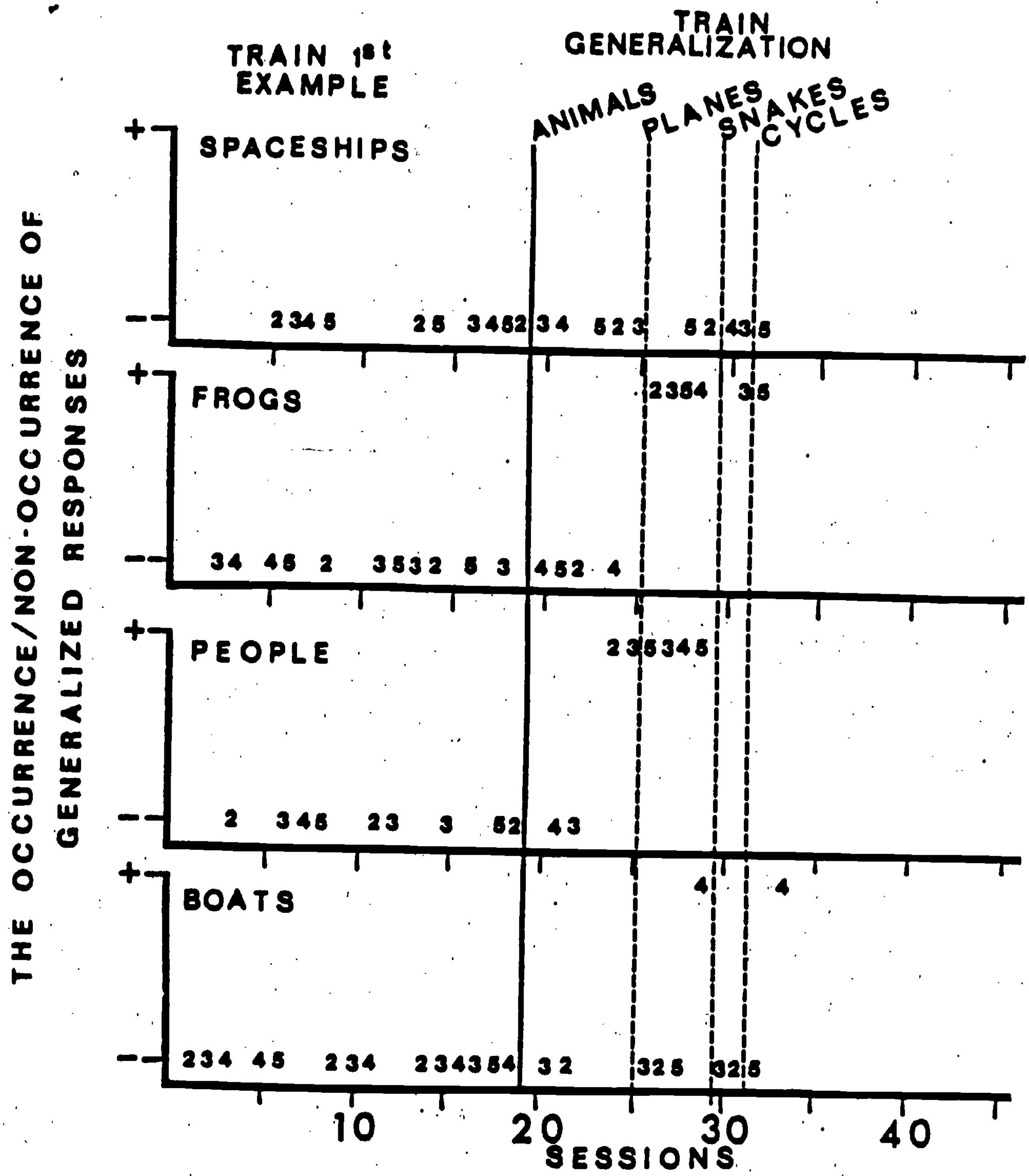

TRAIN 1st EXAMPLE
TRAIN GENERALIZATION
BOATS/S.SHIPS/BUGS/PEOPLE
AIRPLANES
ANIMALS
SNAKES
TANKS
THE OCCURRENCE/NON-OCCURRENCE OF GENERALIZED RESPONSES
10
20
30
40
SESSIONS

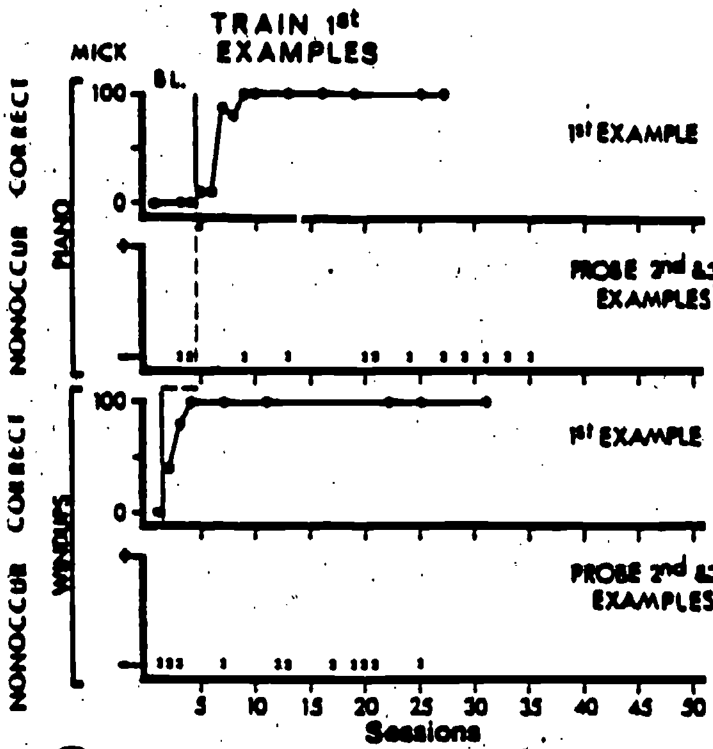
JIM

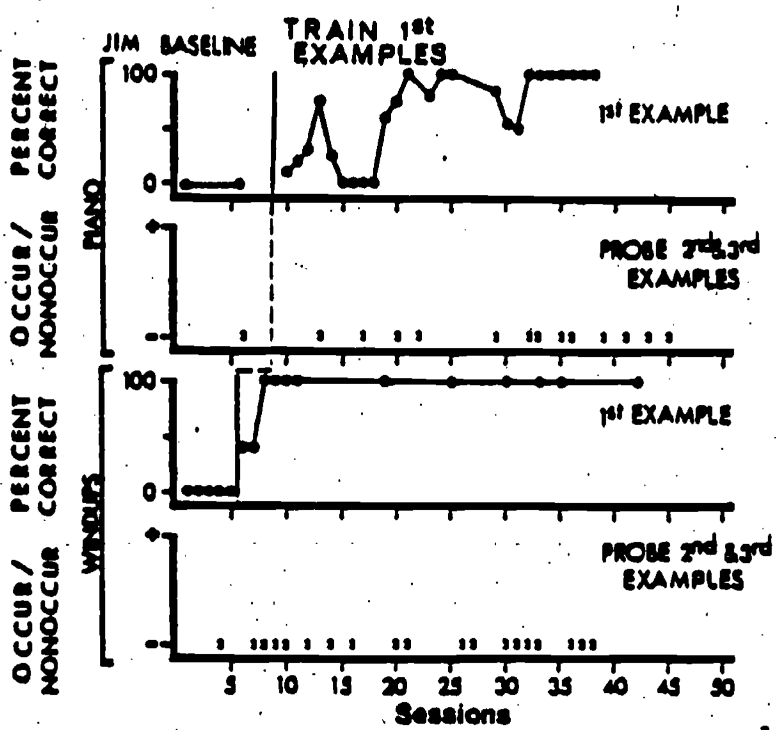


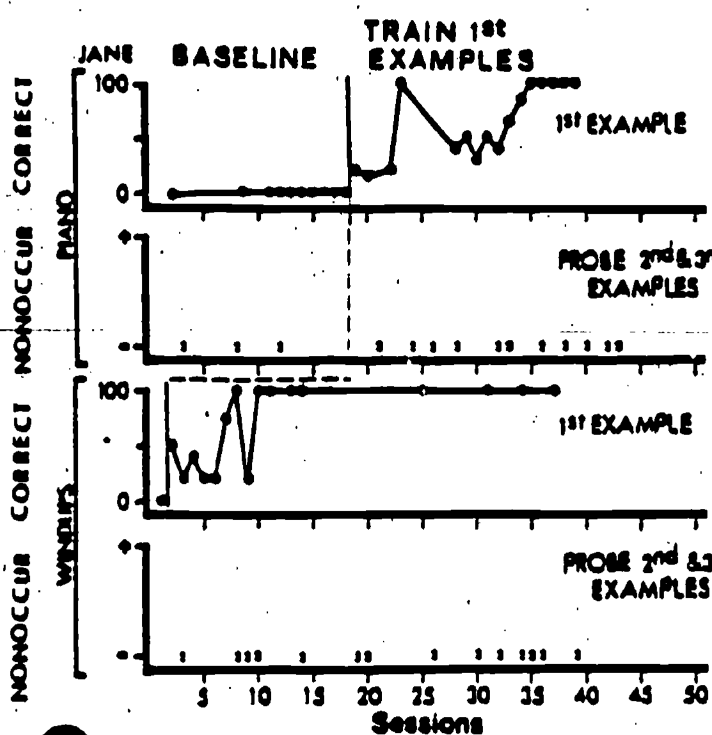
TRAIN 1st EXAMPLE
TRAIN GENERALIZATION
S.SHIPS PLANES BUGS ANIMALS
PEOPLE
SNAKES
BOATS
MOTORCYCLES
THE OCCURRENCE/NON-OCCURRENCE OF GENERALIZED RESPONSES
10
20
30
40
SESSIONS

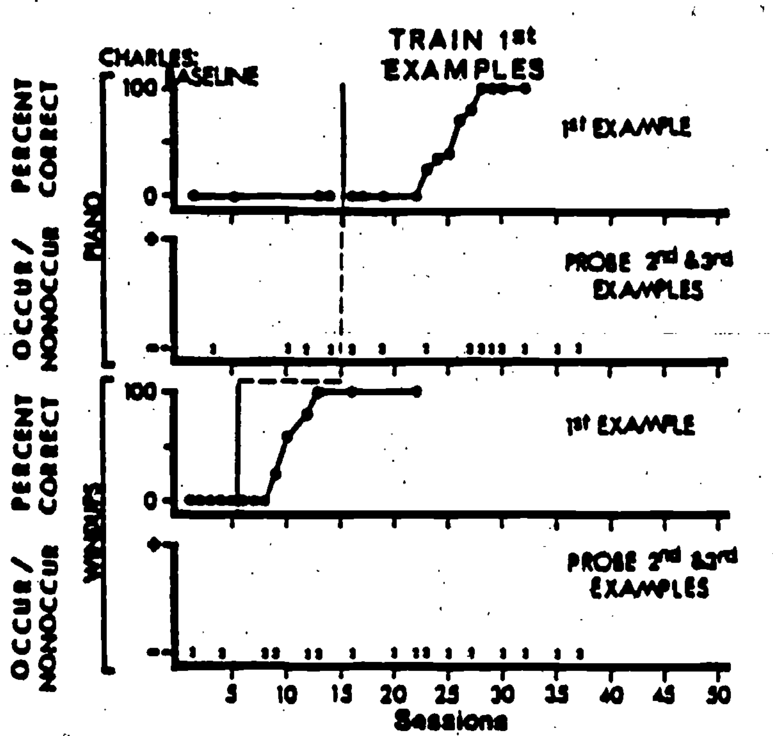
CHARLES


TRAIN 1st EXAMPLE
TRAIN GENERALIZATION
ANIMALS
PLANES
SNAKES
CYCLES
SPACESHIPS
FROGS
PEOPLE
BOATS
THE OCCURRENCE/NON-OCCURRENCE OF GENERALIZED RESPONSES
10
20
30
40
SESSIONS


MICK
BL.
TRAIN 1st EXAMPLES
NONOCCUR CORRECT
PIANO
WINDUPS
1st EXAMPLE
PROBE 2nd & 3rd EXAMPLES
Sessions


JIM
BASELINE
TRAIN 1st EXAMPLES
PERCENT CORRECT
OCCUR/ NONOCCUR
PIANO
WINDUPS
1st EXAMPLE
PROBE 2nd & 3rd EXAMPLES
Sessions


JANE
BASELINE
TRAIN 1st EXAMPLES
NONOCCUR CORRECT
PIANO
WINDUPS
1st EXAMPLE
PROBE 2nd & 3rd EXAMPLES
Sessions


CHARLES:
BASELINE
TRAIN 1st EXAMPLES
PERCENT CORRECT
OCCUR/ NONOCCUR
PIANO
WINDUPS
1st EXAMPLE
PROBE 2nd & 3rd EXAMPLES
Sessions

The Effects of Peer Tutoring and Special Friend Experiences on Nonhandicapped Adolescents*

Thomas Haring, Catherine Breen, Valerie Pitts-Conway,
Mellanie Lee and Robert Gaylord-Ross

San Francisco State University
and
Marin County Office of Education

Running Head: Peer Tutoring and Special Friends

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The success of integration is to be determined by the educational and social effects on both the handicapped students and their nonhandicapped peers. Few would disagree that the benefits to many handicapped students have been positive and productive in terms of improving quality of life and normalization of these individuals. However, the benefit to the nonhandicapped students has been of controversy due to conflicting research results. One commonly used means of evaluating the effect of integration on nonhandicapped students has been to assess their attitudes toward their peers. Gottlieb & Budoff, 1973; Gottlieb, Cohen & Goldstein, 1974; and Gottlieb & Davis, 1973; each found more positive attitudes toward disabled persons in settings where handicapped students were not integrated. Behaviors reflecting pity, fear, disgust and rejection toward peers have been observed in integrated settings (Jones, 1972; Burton & Hirshoren, 1979). And, according to some, negative attitudes may worsen as both populations mature (Ayer, 1970; Kang & Masoodi, 1977; Larsen, 1975; Panda & Bartel, 1972; Rapier, Adelson, Carey & Croke, 1972).

A commonality of this research is that little or no systematic intervention was implemented to educate the nonhandicapped students in order to alleviate fears toward and misconceptions about the abilities of disabled persons. Voeltz (1980) contends that modification of one's attitude and resultant behaviors is possible through systematic educational intervention. She states that

> Even is researchers were to document that handicapped children exhibit an intolerance for their handicapped peers that includes a willingness to engage in overtly

cruel behavior, this should posit a challenge to educators rather than a limitation. Surely such behavior of presumable "normal" children is as susceptible to change as the behavior of severely handicapped children, now apparently acquiring skills once thought unattainable. (Page 463)

Many researchers now agree that the critical component in producing successful integration is not merely bringing the two populations together and then standing back expecting to see magical friendships grow, but is the development of systematic techniques to guide interactions and produce healthy, educated opinions about persons who deviate from the norm (Bricker, 1978, Donaldson, 1980; Fredericks, Baldwin, Grove, Moore, Riggs & Lyons, 1978; McHale & Simeonsson, 1980; Salend & Moe, 1982; Stainback & Stainback, 1980; Stainback, Stainback, Raschke & Anderson, 1981; Voeltz, 1980, 1982).

Approaches used to contend with negative attitudes and discriminatory behaviors can be categorized in the following areas: (1) the use of slides, films and lectures (2) education through literature (3) disability simulation and (4) structured direct contact with handicapped peers. The use of the first two approaches alone have had very limited success in improving attitudes. Programs which are persuasive and merely factual in nature have at best resulted in no change in attitude (Forader, 1970; Seltzer, 1977; Wyrick, 1976). Salend & Moe, 1982, investigated the effects of children's books about handicapping conditions on the attitudes of nonhandicapped students both alone and in combination with simulation activities. They found no significant differences in attitude using the books alone, but did find some differences in the book + activities condition. These findings were supported in a similar study by Leung (1980). The third strategy has found some limited success in improving attitudes. Simulation activities can be successful if they are done in such a way that allows the role player to observe the reactions of nondisabled persons (Clore & Jeffrey, 1972; Donaldson, 1980). If reactions of others are not inherent in the program typically, little change will be seen. (Wilson & Alcorn, 1969).

The fourth strategy has again resulted in contradictory results. McHale and Simeonsson (1980) used 6 second and third graders to teach same aged autistic children how to play during a 30-min leisure period in the special education classroom. They found no significant change in attitude from the beginning of the intervention to the end, but did indicate an increase in understanding of autism. Voeltz (1980, 1982) introduced a "special friends" program to structure interactions between cross-age nonhandicapped and severely handicapped peers during recess and social events. She found significant increases in positive attitudes for this high-contact group and no significant change across a no-contact group. She explains the discrepancy between the two investigations. While McHale and Simeonsson presented the purpose of the play interactions in terms of teaching the autistic students to play, Voeltz encouraged interaction on a more friendship, noninstructional basis. Voeltz (1982) contends that tutorially-oriented programs may not be a positive alternative to helping relationships which may foster negative attitudes. Donaldson (1980) supports the notion that contact with handicapped individuals is only successful in terms of modifying attitudes if there is at least equal status between the two individuals. Equal status relationships are defined as either same age, or equal social, educational, or vocational status. Nonequal status occurs when the disabled person is significantly younger than the nondisabled person or is in a position of receiving help or assistance. Donaldson reports that positive attitudinal shifts were seen in seven out of eight studies of contact where equal status interactions were present (Anthony, 1969; Donaldson & Martinson, 1977; Evans, 1976; Langer, Fiske, Taylor & Chanowitz, 1976; Marsh & Friedman, 1972; Rapier, et al, 1972; Sedlick & Penta, 1975).

The initial purpose of the present investigation was to examine attitude change among high school students toward severely handicapped autistic peers following two types of direct contact prgrams, one of a tutorial nature and one of a noninstructional, "friendship" nature. A third group consisting of no-contact volunteers was used to replicate the findings that structured direct contact with severely handicapped peers will result in greater attitude change than will no contact.

While much emphasis has been placed on examining and modifying attitudes of nonhandicapped students toward their handicapped peers, research is severely lacking in examination of resultant generalized behavior change following intervention. Unfortunately, attitudes and behavior do not necessarily correlate. Responses on attitude scales can be confounded by assumed pressures to say what's right, misreading or misunderstanding of items, and uncontrolled environmental conditions. McHale et al conducted behavioral observations assessing the frequency of play, communication, solitary play, and interaction with the autistic children. They found some relationship pretest between social desirability to interact and conceptions of autism based on the attitude scale, and the children's solitary play and communication with autistic peers. There was no relationship between the scale measures and behaviors posttest.

The second purpose of the investigation was to assess behavior change following intervention. A series of 5 min behavior probes and a confidential interview were implemented pre and posttest.

Method

Participants

During the 1982-83 academic school year 27 nonhandicapped high school students from the 9th to the 12th grades participated in the study. The participants prior to the beginning of the investigation had had no extensive experience interacting with handicapped individuals. None had immediate family members with handicapping conditions and none had prior involvement with classrooms for the handicapped. All participants showed active interest in participating in the present study as a result of one of the following recruitment procedures. Informal discussions describing the types of interactions and activities to occur in the special education classroom were held in a psychology, English and history class at the beginning of each semester. Counselors were requested to mention the program to all students with available time slots. Notices describing the program were posted in all areas of the school. And former teacher assistants were asked to inform their friends of the program. The high school students were told that participation in the program would entail, in addition to working a specified number of hours, completng a short survey and answering a few confidential questions. The participants were blind as to the nature of the research questions.

The special education classroom consisted of 9 students ages 17-21 with severe handicapping conditions including autism, severe mental retardation and severe visual and hearing impairment. All of the students displayed self-stimulatory and aggressive behaviors.

Setting

All attitude measurements were conducted in the classroom and in an office adjacent to the classroom. Behavior probes were taken in a 3m x 4m leisure area with the confederate sitting alone on a couch, the participant sitting at a round table 2m from the couch and a data collector positioned at a table 7m to the diagonal of the leisure area.

All handicapped-nonhandicapped interactions occurred in the classroom, in a courtyard outside of the classroom, at various sports areas of the school and in a shopping area one block southwest of campus.

Procedures

A pretest-posttest experimental design was employed. Following a stated intent to participate each student was randomly placed in one of three experimental groups. The first contact group consisted of teacher assistants who were required to come to the special education classroom for one 50 minute class period each day. At the beginning of each period the participant was instructed by the classroom teacher to work with 2-3 autistic students in a formal structured activity which required giving systematic cues, prompts and consequences, and recording data. Each new activity was modeled by the teacher prior to the teacher assistant giving instruction. Instruction in calculator, shopping, cooking, money exchange, reading, vocational and language skills were those activities sampled.

A second contact group was described as an independent study group. The participants were required to spend four hours each week interacting in some direct way with the students from the severely handicapped classroom. The assignment of hours was flexible and arranged with the classroom teacher at the beginning of each week. Each participant was allowed to use the time before and after school, school breaks and any free class period to fulfill his/her time requirement. Prior to the beginning of the program each independent study participant was to observe the students in the classroom for 1-2 hours. Other than a posted list of suggested activities and students already trained to participate in those activities, no instructions were given to the participants upon entry into the classroom. All questions concerning particular student behavior, language modes, or abilities were answered directly by the classroom teacher and suggestions as to how to most effectively respond in the presence of aberrant behavior were given. The suggested activities were all of a leisure-recreational type including playing frizbee, football, tennis, or basketball; playing Uno, Fish or checkers; going to the pizza parlor to play videogames, to an ice cream parlor or to a local restaurant; and taking a walk or just "hanging out" around school.

The third experimental group was a no contact control group. The two contact groups each received 5 units of high school credit for participation in the program. There were an equal number of participants in each experimental group.

Measurement

Three objective measurements of attitude were given to each ofthe 27 participants prior to the start of the program and at the completion of a semester (15 weeks). A survey was administered consisting of 61 questions. The questions reflected four variables affecting one's overall attitude toward handicapped individuals. Knowledge of handicapping conditions, amount of contact with persons with handicapping conditions, affect toward and social willingness to interact with handicapped individuals were the four variables assessed in the survey. The variables were determined in an initial factor analysis of the survey done the previous year using the results of completed forms by 300 high school seniors. Handicapped was defined to the participants as "any handicap including mental retardation, deafness, blindness, physically crippled and emotionally disturbed." The format of the survey required making 3 pt. choices (yes, no or unsure; hardly ever, once in a while, or a lot; and never, hardly ever, or once in a while). The survey was developed by a committee of persons from San Francisco State University employed by the Socialization Research Project.

A second measurement used was a 5 minute behavior probe which measured the duration and type of interactions initiated by the participant toward each of three confederates. A time sampling procedure of 15 sec observe, 5 sec record was used to assess the participant's behavior when left alone in a setting with one of the confederates. Three probes were conducted with each member of the three experimental groups prior to involvement in the program and at the close of one semester. The three confederates probes of participant behavior were done with Monte, a familiar autistic individual who was a student in the special education classroom; Jorge, a nonfamiliar, autistic individual who was a student from a classroom on another campus; and Bob, a nonfamiliar nonhandicapped student from San Francisco State University. Monte and Jorge were selected to act as confederates based on their similarity in responding to initiations by others, their inability or unwillingness to initiate interactions with others, and their relative absence of inappropriate aberrant or unpredictable behavior. Bob, the nonhandicapped confederate was instructed to behave similarly; he was to respond appropriately to questions and statements, but he was not to initiate interactions with the participants.

A third measure of attitude and attitude change was a 15-20 min candid interview with each participant focusing on recent and distant contact with handicapped individuals, self affect and assumed affect of others toward handicapped persons, willingness to be similar to and different from his handicapped and nonhandicapped friends, and evaluation of what will and what should happen to the handicapped students in the class once they leave school. As with the other measurements, a pre and post test was conducted with all 27 participants.

Results

Paper and Pencil Survey

Pretest results. Figure 1 displays the mean percentage of statements to which positive responses were attributed within each of the four attitude factor classes. Responses to social willingness, knowledge and affect statements yielded greater than 80% positive responding in each of the three participant groups. 48-58% of contact statements were responded to positively prior to intervention.

An analysis of paper and pencil responses was conducted examining high schools students who either do volunteer or would like to volunteer in the special education classroom, and those who do not and would not volunteer. Figure 2 indicates twice the social willingness to interact with handicapped peers by volunteers than by nonvolunteers. All results indicate responses made prior to intervention.

Post test results. No significant differences were found on survey measurements between pre and post test within any of the three volunteer experimental groups. As all volunteers expressed positive attitudes on the paper and pencil measurement prior to contact with handicapped peers there was no room for significant improvement in attitude scores following intervention. Some improvement was found on the contact variable post test in each of the three experimental groups, perhaps due to greater visibility of the autistic students schoolwide.

Interview Data

Figure 3 displays data obtained during 20-minute interviews pre and post intervention. The figure delineates the motivations for volunteering in the special education classroom. While pretest results indicate greater frequencies of need for school credits and desire to satisfy curiosity, posttest results yield motivation to continue as a result of liking the students and the experience being fun. This data includes responses made by both peer tutors and special friends. Analysis of peer tutors and special friends as separate groups indicate no consistent differences in motivation to participate pre and post test.

Behavior Probe Data

Figures 4 and 5 show mean duration of interaction in seconds pre and post intervention initiated by special friends, peer tutors, and nonparticipant volunteers (controls). The figures show that among special friends and peer tutors there is an increase in duration of interaction particularly toward a familiar autistic peer following intervention (1-71 secs, .5-32 secs respectively), some increase in duration toward an unfamiliar autistic peer (1.2-9.7 secs, .4-12 secs), and no increase in duration of interaction initiated toward an unfamiliar nonhandicapped peer (2-1.2 secs, 0-0 secs). There is no change in duration of interaction toward three confederates from pre to post intervention among nonparticipant volunteers. While a level difference posttest is seen graphically between special friends plus peer tutors in duration of interaction initiated toward a familiar autistic peer, that difference was not found to be significant. The difference in duration of interaction between active volunteers and nonparticipant volunteers was, however, found to be significant.

Figure 6 displays the changes in the number of interaction types present during observation periods pre and post intervention. Prior to systematic prompting of contact between handicapped and nonhandicapped peers, volunteers initiated no more than two types of interaction, including an exchange of smiles and social vocalizations. Following intervention, the types of interactions with a familiar autistic peer increased to 8 types of initiated interactions by peer tutors, and to 10 types by special friends. Toward an unfamiliar autistic peer, types of interaction increased from 1 to 2 among peer tutors and 2 to 6 among special friends. There were no increases in the number of interaction types among nonparticipant volunteers pre to post test. Post test interactions initiated by volunteers included smiles, physical affect, gestures, modeling, the use of verbal reinforcement, asking questions, teaching vocalizations, social vocalizations, teaching using materials, and social material manipulation.

Reliability

Reliability procedures were conducted during 20% of the interviews and 22% of the behavior probe sessions. Interviews were tape recorded and independently scored by two trained graduate students. Measurements yielded 99.5% agreement with a range of 96-100%. Two independent observers recorded time sampling data during behavior probes using two stop watches and a central room clock. The observers sat 4m apart both facing the participant and confederate. Both observers were unfamiliar to the participants and displayed themselves busily working on unrelated project work. Measurements of total duration of interaction during a 5 min probe showed a mean score of 90.4% agreement with a range of 44-100% and a median of 100%. 95.5% agreement was found on types of interaction initiated by the participants with a range of 66-100%. All reliability coefficients were determined by the formula

$\frac{A}{A+D}$ x 100 where A = number of agreements and D = number of disagreements.

Discussion

Contact with autistic peers four hours per week for 16 weeks resulted in a significant increase in amount and type of interaction with handicapped peers during noninstructional periods. Motivation to participate was additionally altered following contact so as to include more positive reasons for participation.

While slight differences were found in willingness to interact as indicated by behavioral observations between special friends and peer tutors, the differences were not found to be significant. Consequently, no support was found for the hypothesis that type of contact will influence the attitudes and behavior of nonhandicapped students toward handicapped peers.

Analysis of data regarding interactions toward an unfamiliar nonhandicapped peer indicates that typically high school students will not or will minimally interact with strangers, even same-age strangers. The present investigation found higher frequencies of interaction toward an unfamiliar handicapped peer than toward an unfamiliar nonhandicapped peer. A possible explanation for this contrasting information is that all observations were done in the special education classroom, an environment where the contingencies for interacting with the handicapped peers were positive and understood. Interacting with the students in the classroom was a part of the daily routine and while observations were conducted during noninstructional periods, the stimuli for interaction were consistently present. Observation in environments separate from the special education classroom need to be done in order to make conclusive statements regarding realistic behavior toward handicapped peers following systematic contact.

All students probed in the first year of this investigation were volunteers. All had some intrinsic motivation for participating; at very least, all had fewer fears of interacting with handicapped persons than nonvolunteers. Those students who volunteered entered the program with generally positive feelings toward their handicapped peers. It's evident that if our goal is to promote attitude change, we need to target students whose attitudes are initially less than positive. Development of programs designed to intervene on relationships between handicapped students and peers who would normally refuse to initiate contact should be our priority concern. Establishment of more tangible incentives to participate other than school credit, or incorporating a required work experience class into the curriculum may be necessary, particularly at the secondary level, if we are to reach the most resistive students.

Overall, both the peer tutor and special friends program were successful, as evidenced by data collected during interview and observation sessions, in promoting further interactions between peers and encouraging more positive, normalized reasons for continued interaction with peers.

The second year of investigation will serve to increase sample sizes, validate previously recorded data, collect descriptive data of the participants, determine correlations between measurements, determine correlations between attitude and behavior, and adapt observational measurements to nonclassroom settings.

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The Use of Differential Reinforcement of Other Behaviors to Reduce Stereotyped Behavior of Autistic Students During Group Instruction.

Thomas G. Haring

University of California, Santa Barbara

Catherine G. Breen

San Francisco State University

Valerie Pitts-Conway

Marin County Office of Education

and

Robert Gaylord-Ross

San Francisco State University

Running head: DIFFERENTIAL REINFORCEMENT DURING GROUP INSTRUCTION

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Requests for reprints can be sent to Thomas G. Haring, Graduate School of Education, University of California, Santa Barbara, California, 93106

Abstract

The effects of a procedure based on differential reinforcement of other behaviors (DRO) on stereotypic responses and task performance was tested with three autistic students. The procedure was unique because the time interval employed between potential opportunities for reinforcement was the natural length of one instructional trial delivered to a peer. Thus, the procedure was designed to reduce the level of stereotypic responses during small group instruction. The results indicated that the procedure exerted functional control over the students stereotypic responses. In addition, two of the students had significantly greater percentages of correct responses under DRO conditions. The results are discussed in terms of models for intervention within task contexts and the usefulness of the procedure under natural teaching conditions.

The Use of Differential Reinforcement of Other Behaviors to Reduce Stereotyped Behavior of Autistic Students During Group Instruction

The differential reinforcement of other behaviors (DRO) has been advocated as a non-aversive alternative for controlling stereotypic behaviors of autistic students (La Vigna, 1980). Despite a relatively long history of research, there continues to be interest concerning investigations of DRO because there are few other methods based on positive reinforcement that are effective with youth who have severe handicaps. In typical applications of DRO, a reinforcer is delivered after some specified amount of time elapses without the occurrence of a targeted behavior.

While it is preferable to attempt to control aberrant behavior with non-aversive procedures such as DRO (Gaylord-Ross, 1980), problems in using DRO have limited its use by teachers and behavioral specialists (Schrader, Shaul, & Elmore, 1983). Specifically, DRO may be rejected as a possible positive alternative because the procedure is seen as too time consuming to effectively implement, especially when extremely short time intervals are used. Additionally, the research literature concerning applications of DRO has frequently been artificial in nature in that the procedure has been applied while students are not occupied in typical school, home, or vocational activities. Frequently in studies concerning DRO, one experimenter is available to work with one student for relatively long periods of time.

Within school programs for autistic youth, one teacher frequently teaches several students simultaneously by alternating instructional trials between students. Effective procedures are needed to reduce the stereotypic behaviors of autistic students that can be applied under typical group teaching conditions. The present investigation concerns the application of a DRO procedure that has been adapted for use during group instruction.

While there are few investigations using DRO with autistic students, there is a well established literature with mentally retarded students (Dehaven, Rees-Thomas & Benton, 1980; Harris & Wolchik, 1979; Konczak & Johnson, 1983; Luiselli, Pollow, Colozzi & Teitelbaum, 1981; Luiselli & Slocomb, 1983; Murphy, Nunes & Hutchings-Ruprecht, 1977; Repp, Deitz & Speir, 1974). Unfortunately, most studies included DRO in larger treatment packages (eg. Luiselli & Krause, 1981) rather than investigating its effectiveness as a discrete treatment (e.g. Foxx & Azrin, 1973; Rose, 1979). Consequently, it is still unclear to what extent DRO would be effective when used without the concurrent use of other procedures intended to reduce behavior problems.

Given that instruction within small groups has been found to be organizationally more efficient than one-to-one instruction, (Alberto, Jobes, Sizemore & Doran, 1980; Favell, Favell, & McGimsey, 1978; Rincover & Koegel, 1977; Storm & Willis, 1978), the procedure was designed to reduce the occurrence of stereotypic behavior while another student received an instructional trial. Because the purpose of the study was to test a DRO procedure during instruction, DRO was used in combination with rewards for correct responses during instructional trials. Thus, a second purpose of the study was to investigate the effects of the simultaneous use of two schedules of reinforcment (DRO for stereotypic behavior and continuous reinforcement for correct responses). The procedure could be defined as a multiple schedule intervention (Ferster and Skinner, 1955) because the students were required to met a pre-set criterion for stereotypic behavior and correct responses on tasks in order to gain access to reinforcement.

Method

Participants

Three autistic youth between the ages of 14 and 21 participated. The participants had been classified as autistic by independent agencies prior to the start of the experiment and conformed to standards for diagnoses of autism and developmental delay with autistic characteristics (Ritvo & Freeman, 1978). Each student was considered to be severely handicapped and required instruction in all major areas of life functioning. They displayed high levels of stereotyped behaviors such as rocking, vocalizations, jumping, and finger flapping. The students were selected for inclusion in the study because behavioral observations indicated that their stereotyped behavior significantly interferred with responding to instructions.

Susan, who was 17-years-old, was estimated to be functioning at the 6.0-year-old level with the Vineland Social Maturity Scale. She had a small functional vocabulary and would request items, label items, and express basic needs. However, most of her speech consisted of delayed echolalic phrases which would be repetitively produced. Carl, who was 14-years-old, was estimated to be functioning at an age equivalent of 2 years, 11 months with the Vineland Social Maturity Scale. He did not use speech functionally, although he produced vocalizations in a repetitive sing-song fashion. He communicated wants and needs using protest responses, and gestures toward desired items. Donald, who was 21-years-old, was estimated to functioning at approximately a 2.5-year-old level with the Vineland Social Maturity Scale. His speech consisted of single-word labels and simple requests. Using the AAMD Adaptive Behavior Scale (comparing to an institutionalized population), his stereotypic behavior was estimated to be within the 85th percentile. At the time of the study, each student was enrolled in a special education program for autistic and other severely handicapped adolescents. Their school program stressed systematic instructional procedures applied to independent living skills, and social-communicative exchanges with nonhandicapped students.

Setting

All sessions were conducted in the participant's special education classroom. The classroom was 7m by 10m and was sub-divided into a leisure area, an area simulating a sheltered workshop environment, and an area for small group instruction. Experimental sessions were conducted in the group instruction area. The group instruction area was 2m by 3m and was physically separated from the classroom with the use of two partitions. The area contained a table and three chairs. After each instructional session, the students received free-time in the leisure area. The free-time area was designed to simulate a family room environment. It contained a sofa, a record player, several comfortable chairs, and various free-time activities such as magazines and games.

Teacher and Observers

The same teacher (the second author) conducted all of the sessions with the three students. The teacher had extensive experience in conducting behavioral training with autistic students. The observers were the first author and an advanced graduate student with extensive background in recording responses as they occur in real time. The graduate student was blind as to the experimental hypotheses.

Instructional Tasks

The tasks were those currently being taught in the school program and were included in each participant's individualized instructional program. Alterations in the instructional programs, i.e. addition of new stimuli, were made as students met criterion with specific items. The tasks were taught using a correction procedure. That is, following the delivery of an instructional cue by the teacher, the students were given 3 sec to independently initiate a response. If a response was not initiated or if the response was incorrect, the student was prompted to produce the correct response. The prompts delivered were initially either verbal prompts or gestures to bring the student's attention to the features of the task that would promote a correct response. Failing those less intrusive responses, the students were be physically guided to produce the correct response.

Susan. A payment strategy was being taught. The teacher prompted Susan to choose a packaged grocery item from several on the table. The teacher then delivered the cue, "That will be (price on package) please." The student responded by counting out dollar bills until she had counted one dollar more than the dollar amount requested by the teacher (e.g. if the teacher requested $2.45, she counted out three dollars).

Carl. Selecting the proper coin combination for riding public transportation was being taught. Two quarters, a nickel and a dime were placed in front of the student. The teacher presented the instruction, "Get your bus money." The student responded by selecting the dime and a quarter.

David. This student was being taught to partially participate in preparing shopping lists for meals. Donald was presented with a 10 X 20 cm picture of a meal. Donald responded by saying the name of at least four foods in the picture.

Experimental Design

An ABAB design was employed for each of the participants. Following exposure to baseline conditions (A), the DRO intervention (B) was introduced. Soon after the DRO procedure produced a noticeable change in the level of stereotypic responding, the procedures were reversed to baseline conditions (A). Following a noticeable increase in stereotypic behavior, the DRO procedure (B) was again introduced. One session was run per school day. Sessions ranged in length from 5 to 25 minutes.

Baseline

The sessions began with the teacher prompting a participant and another autistic student to stop working on an independently performed pre-vocational task and enter the small group instructional area. The same autistic peer received instruction with all three participants. All training was conducted with the teacher, the autistic peer, and one of the participants. Training was conducted in a discrete trial format, with the teacher alternating from student to student.

The classroom that the students attended employed a token economy throughout the school day. During each task, students received tokens on a variety of schedules, including continuous reinforcement and variable interval schedules. During baseline sessions students received one token for each correct response. Tokens (actual coins) were placed on cards that were located to each student's side. The card was marked with ten circles. When each circle was covered with a coin, the student said "I'm finished", and independently took a five minute break in the classroom's freetime area. Thus, the number of trials during baseline varied from day to day depending on the number of errors that a student made. The number of trials averaged 14, with a range of 10 to 19 per session. One session was conducted per school day.

<u>DRO</u>

The DRO sessions were conducted exactly as the baseline sessions with the following changes. The token card by the student's side was altered such that five of the circles were colored red, while five remained white. Students continued to receive tokens for each correct response during instructional trials. Tokens received for correct answers were placed over the white circles. When the students omitted specific stereotypic responses during the peers trial, they received a token which was placed on a red circle. Immmediately after the peer's trial the teacher determined whether or not an operationally defined stereotypic behavior had occurred during the trial. If a stereotypic response had occurred the teacher ignored it and conducted another trial with the peer. The teacher continued to ignore all stereotypic behavior until one complete instructional trial with the peer had occurred without stereotypic responses from the participant. Thus, the procedure corresponds to the suggestion made by Bellamy, Horner and Inman (1978) that students not be prompted to come "on task". Instead, the student is rewarded for bringing themselves on task (ie displaying good waiting behaviors). As before, the student was required to fill all circles on the token card prior to receiving a five minute break. During DRO sessions, the teacher delivered tokens for correct responding, and the autistic peer (prompted by the teacher) delivered tokens to the autistic participant for omitting stereotypic responses.

Dependent Variables

Autistic Stereotypic Behaviors. Prior to the start of experimental observations, the authors made extensive nonexperimental observations of the autistic student's behavior during instruction. Based upon these independent observations, a list of behaviors was produced for each participant. Only those responses which would potentially interfere in the instructional process were included on the list of responses for each student. All of the responses that were operationally defined for the experiment were performed repetitively and corresponded to definitions of stereotypic behaviors typically employed with autistic students. The specific stereotypic responses for each student are descibed in Table 1.

Insert Table 1 about here

The teacher recorded the occurrence or nonoccurrence of stereotypic behavior during each instructional trial that the peer received. The dependent variable was the number of trials required to met criterion (5 trials, not necessarily consecutive, delivered to a peer wherein the student did not produce a targeted stereotypic response).

Task Performance. The dependent variable reflecting task performance was the percentage of unprompted correct responses. The teacher (and observers) counted the number of correct unprompted trials and the number of trials that required a prompt.

Reliability of the Dependent Variables

Two independent observers scored 19 (24%) of the sessions. Reliability sessions were conducted at least once during each phase of the study across the participants. The percentage of interobserver agreement was calculated on a point-by-point basis (Kazdin, 1982). The percentage of agreement for the task performance data was 100% on every occasion. The percentage of agreement for the occurrence stereotypic behaviors ranged from 89% to 100% with a mean of 99%.

Results

DRO and Stereotypic Behavior

The results of using the DRO procedure on the stereotypic behavior produced by Susan are represented in Figure 1. The figure shows that the initial baseline data point was collected over 11 sessions of training. Across those eleven days, she required 158 trials to accummulate 5 intertrial (between Susan's trial and a peer's trial) intervals wherein she did not produce stereotypic behaviors. When the DRO procedure was introduced, the number of trials required to reach the criterion dropped to a mean of 29.8. When the baseline conditions were again introduced, Susan required 54 trials to reach the criterion. The figure indicates that those 54 trials were conducted over 4 days. After the second baseline phase, the DRO procedure was again introduced. As before, the DRO procedure produced a reduction in the number of trials required to reach criterion. During the second DRO condition, Susan required a mean of 22.3 trials to reach criterion.

Insert Figure 1 about here

The results for David are represented in Figure 2. The figure indicates that David averaged 15.5 trials to reach criterion during the first baseline sessions. The initial baseline data were colected over 5 sessions. Upon introduction of the DRO procedure, the mean number of sessions required to reach criterion was reduced to 6.5. When the baseline conditions were introduced the second time, the number of trials required to reach criterion showed an immediate increase from the level observed during the DRO condition. The second baseline (which lasted 5 sessions) produced a mean of 21.5 trials. When the DRO procedure was introduced for the second time, a mean of 8.1 trials was needed to reach criterion.

Insert Figure 2 about here

The data for Carl are represented in Figure 3. Figure 3 shows that Carl's initial baseline was somewhat unstable. A mean of 10.5 trials was required to reach criterion. Upon introduction of the DRO procedure, Carl's mean number of trials required fell to 6. On the last two days of the first DRO phase, Carl reached criterion within the minimum number of trials possible. When the baseline conditions were reinstated, the number of trials to criterion progressively increased, ultimately producing a mean of 13.7. When the DRO phase was re-instituted, the number of trials to criterion dropped immediately and produced a mean of 5.8.

Insert Figure 3 about here

In summary, across the three participants, the introduction of the DRO procedure consistently produced means that were lower than baseline performance. In addition, the introduction of the DRO procedure produced a rapid reduction in the number of trials required to reach the criterion. Thus, it appears that the DRO procedure as it was applied produced a functionally controlled reduction in the stereotypic responses of the participants.

Task Performance

The data concerning task performance produced less consistent results. The task performance data was tested using the Irwin-Fisher exact probability test (Marascuilo and McSweeney, 1977). Each student's data were separately analyzed. To perform the test, the baseline data from each participant was combined and tested against the combined data from the two DRO phases. Carl and Susan produced significantly greater percentages of correct responses during DRO conditions (for Carl M = 76.9% and for Susan M = 92.4%) than during baseline condition (for Carl M = 51.5% and for Susan M = 68.3%), For Carl's data, the statistical analysis yielded $Z = 12.1$, $p < .001$,and for Susan's data; $Z = 2.63$, $p < .01$. In contrast, the results for the difference in David's task performance between the two conditions was not significant.

Discussion

The results indicated that the DRO procedure functionally reduced the level of stereotypic responding across the three participants. For both Carl and David, the level of reduction achieved was educationally useful, in that by the end of the study they were performing consistently near the criterion level.

The level of behavior change achieved with Susan was somewhat less educationally important, especially during the first introduction of the DRO procedure. Although the degree of reduction achieved with Susan was substantial, she continued to require an average of nearly 30 trials delivered to her peer in order accumulate 5 trials of omitting the targeted stereotypic responses. Thus on a typical day, the teacher would have to deliver 30 trials to a peer while delivering 5 to Susan. Fortunately, when the DRO procedure was introduced the second time, Susan's mean number of trials dropped somewhat from the initial use of the DRO procedure, and in addition, a negative trend seemed to be established so that by the last two days only 7 and 12 trials were required before Susan accumulated 5 successful trials (however, this still represents omitting stereotypic responses during only 71% and 42% of the peer's trials).

Although the results for Susan's stereotypic responses may arguably be considered to lack a high degree of educational significance (Gaylord-Ross, 1978; Voeltz and Evans 1983), the DRO procedure was associated with improved levels of task performance. This was confirmed through antecdotal reports by the teacher that once Susan was not engaging in stereotypic behavior during a peer's trial, the subsequent trial directed to her produced greater degrees of on-task behaviors. In addition, it was also observed that once Susan had omitted stereotypic responses during a peer's trial, she was likely to continue to omit stereotypic behaviors throughout her trial.

Both Carl and Susan produced significantly higher percentages of correct responses under DRO conditions. Theoretically, this increase in performance could be due to two factors. First, the students may have understood the multiple schedule aspect of the contingency. That is, that both correct responses and good waiting behavior were necessary to achieve reinforcement. It is also possible that once a student brings herself on task (that is, once a student is not engaged in stereotypic responses), the student's attention can be better focused on the task.

An empirical question that remains to be answered is the comparative effectiveness of two models for the reduction of stereotypic responses. The models are: (a) the reduction in stereotypic responses causes an increase in task performance (eg. by allowing the student to focus attention on the task rather than the stereotypic behavior) so that the major focus in intervention should be the direct reduction in stereotypic behavior by applying consequences to the behavior itself, or (b) an increase in motivation for task performance causes decreases in stereotypic responding so that the major focus in intervention should be to manipulate task related variables. The present study is interesting in this regard because ultimately, the student needed to earn access to an instructional trial (by omitting stereotypic behavior during a peer's trial) as a condition for earning an instructional trial and then possibly earning reinforcement for task performance. During baseline, the students had essentially noncontingent access to instructional trials. Under those conditions, the students were under little pressure either to omit stereotypic reponses or to produce high frequencies of correct responses because the student only needed 10 tokens to gain access to the free time area. The rate of producing errors in those trials was not as directly exposed to consequences because students could remain in instruction until sufficient tokens were earned regardless of the number of errors produced in achieving those 10 tokens. During the DRO phases, the students no longer had free access to instructional trials in that they had to omit producing stereotypic responses as a condition for receiving a trial. Hypothetically, the students may have shown increases in task performance because a correct performance was still needed to gain reinforcement, but trials themselves were more difficult to come by, thus the value of each trial to the student was increased. This analysis is consistent with recent findings (eg. Dunlap Dyer & Koegel, 1983; Weeks & Gaylord-Ross,1981) that point to the efficacy of manipulating task related variables (ie. variation in reinforcers, shorter inter-trial intervals, variation in tasks, and task difficulty.) to directly motivate increases in task performance and reduce stereotypic responding as a side effect.

In summary, the application of the DRO procedure was shown to functionally reduce the stereotypic responses displayed by the participants. The procedure was easier to implement than other applications of DRO because the time interval was defined according to the time it took for one peer trial to occur rather than an artifically determined length of time that would require attention to a timing device. The study was conducted under natural teaching conditions while students were being taught age-appropriate, functional skills. The study contributes a testable procedure to serve the growing demand for nonaversive behavior control techniques that are usable under the natural constraints of classroom teaching.

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Table 1

Stereotypic Response Classes Targeted for Reduction

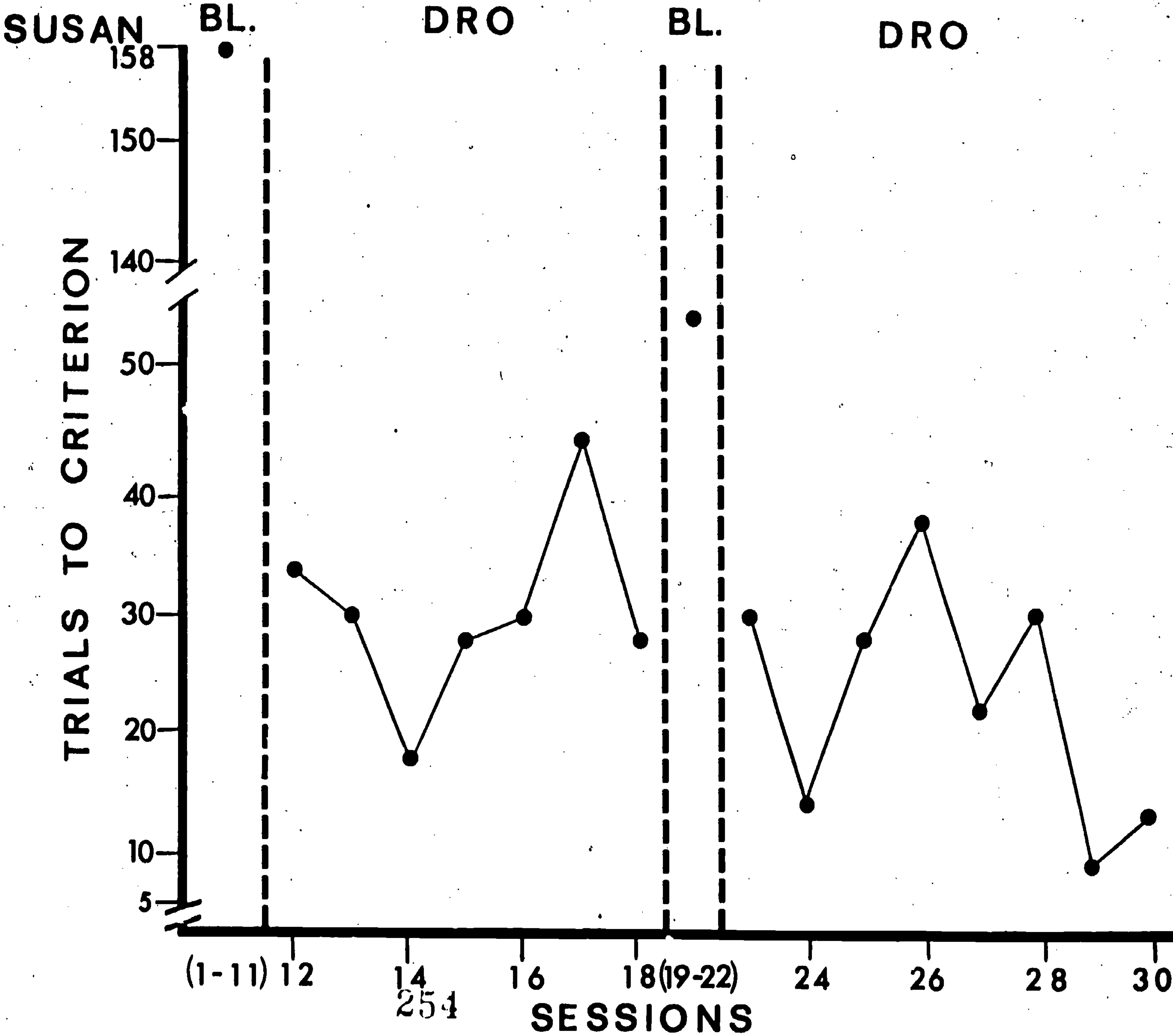
Participant	Response Class
Susan	Singing or speaking louder than a conversational level. Repetively slapping hands or objects onto table surface to produce noise.
Carl	Repeating phonemes (e.g. na-ga) in a sing-song fashion.
David	Non-task related vocalization.

Figure Captions

Figure 1. The number of trials required by Susan to reach criterion during baseline (BL.) and differential reinforcement of other behaviors (DRO). The data points for the first and second baseline phases were collected over 11 and 4 sessions respectively.

Figure 2. The number of trials required by David to reach criterion during baseline (BL.) and differential reinforcement of other behaviors (DRO). The data points for the first and second baseline phases were collected over 5 and 6 days respectively.

Figure 3. The number of trials required by Carl to reach criterion during baseline (BL.) and differential reinforcement of other behaviors (DRO). The data points for the first and second baseline phases were collected over 11 and 3 days respectively.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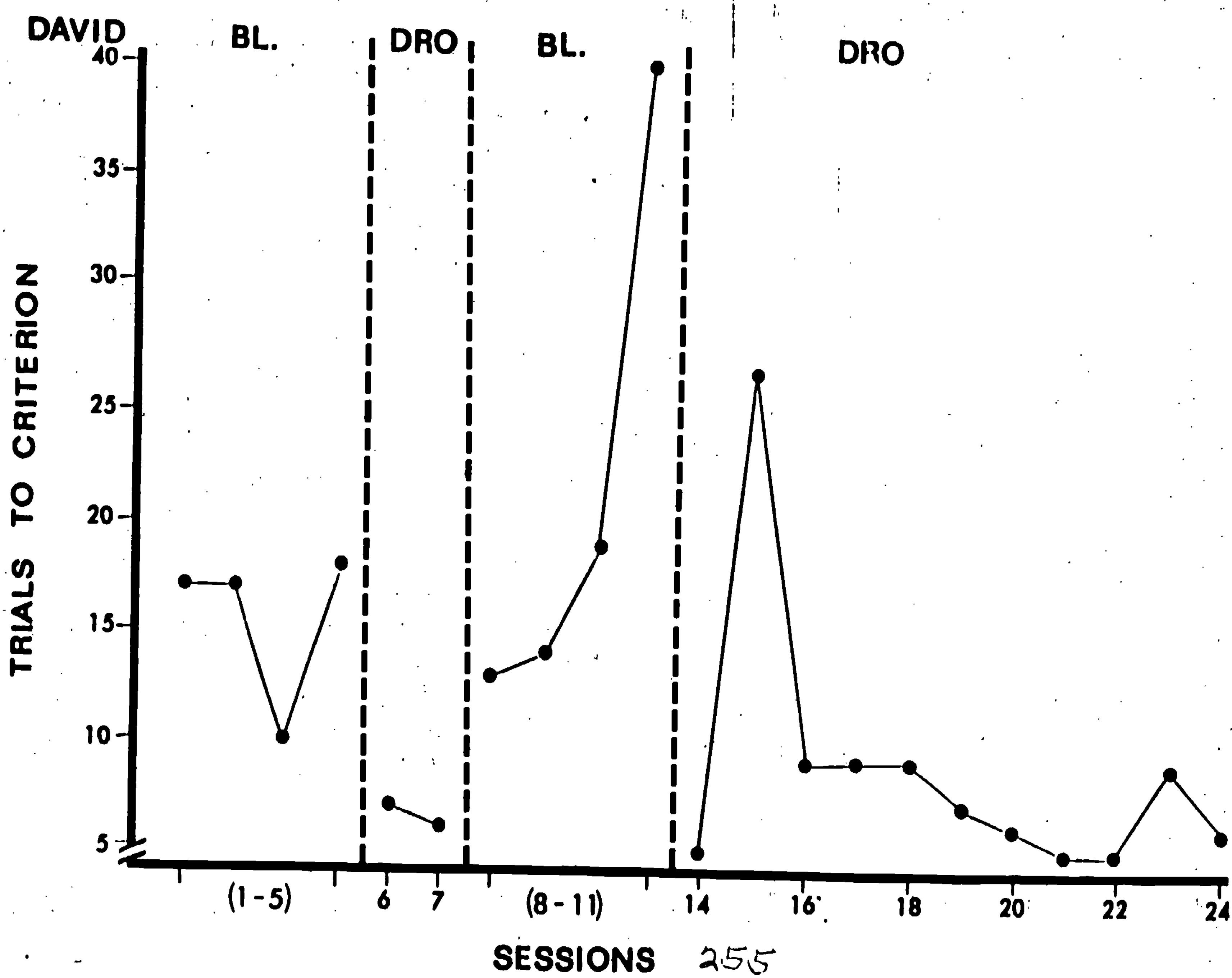
SESSIONS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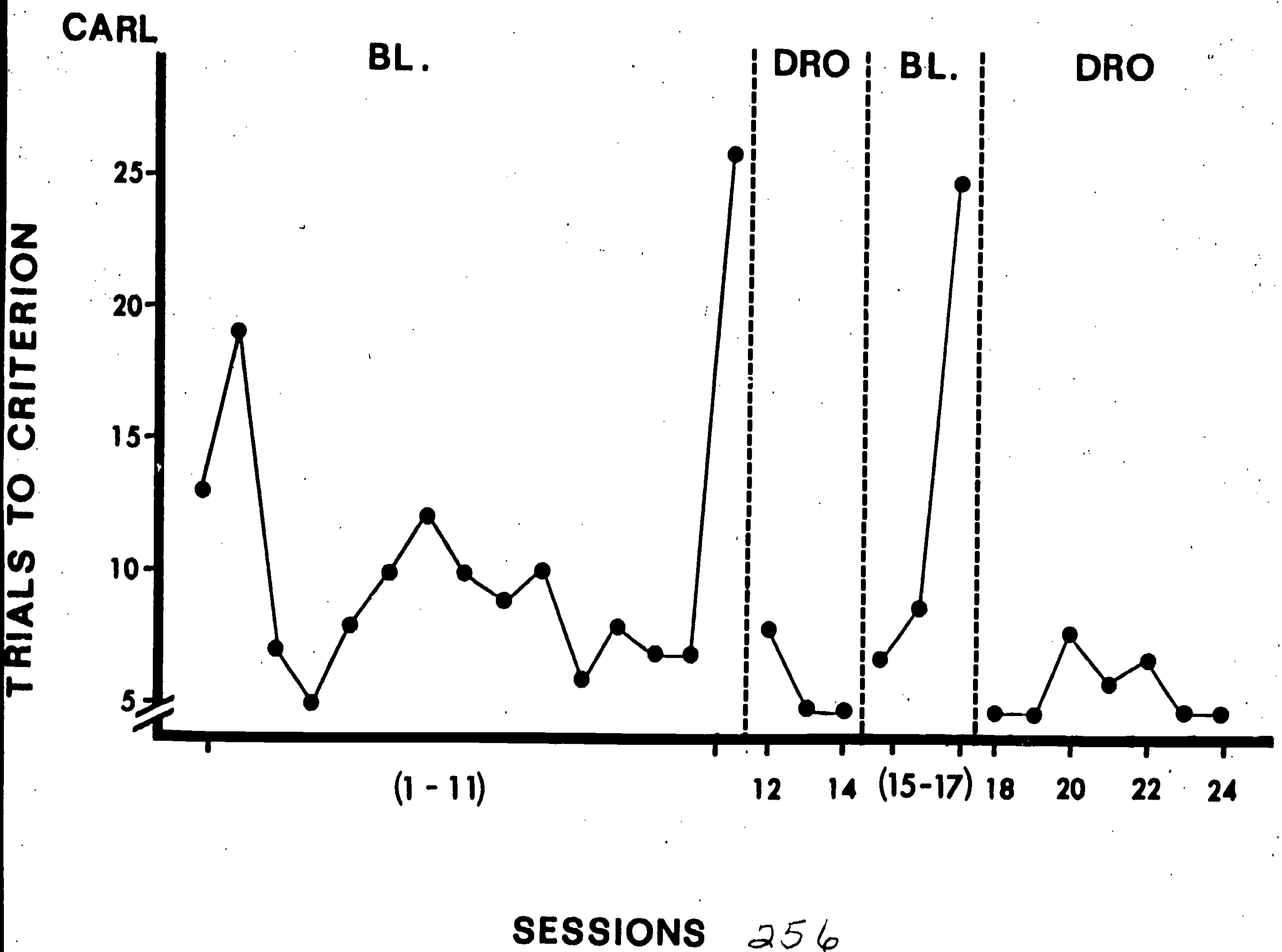
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The Training and Generalization of Social Interaction Skills with Autistic Youth*

Robert J. Gaylord-Ross, Thomas G. Haring, Catherine Breen and Valerie Pitts-Conway

San Francisco State University
and
Marin County Office of Education

Running Head: Social Interaction with Autistic Youth

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Abstract

Two experiments were conducted in order to increase the initiations and duration of social interactions between autistic and nonhandicapped youths. Experiment 1 taught two autistic youth to initiate and elaborate social interactions with three age-appropriate and commonly used leisure objects; a radio, a video game and gum. The students were first taught to use the objects and subsequently instructed in the related social skills. The youths generalized these social responses to other nonhandicapped peers in the same leisure setting. A second experiment trained a third autistic youth to emit similar social leisure skills. The use of the leisure objects and the related social skills were taught at the same time. The autistic youth learned these skills and generalized them to other nonhandicapped peers in the same leisure setting. The importance of teaching generalized social responding in particular subenvironments was emphasized.

The Training and Generalization of Social Interaction Skills with Autistic Youth

The term autism denotes a withdrawal from social interaction with other persons. Individuals diagnosed as autistic display an array of behavioral pathologies such as self-injury, overselective attention and self-stimulation that theoretically are manifestations of the underlying condition of extreme self-directedness. The thrust of past educational and research efforts has been to develop interventions that remediate the behavioral excesses and skill deficits so common among autistic persons. An initial tactic has been to reduce aberrant behavior--like aggression and self-stimulation--through behavior management procedures (Koegel & Covert, 1972). With deviant behavior under control, interventions have been applied to remediate language deficits (Lovaas, 1977) and to teach a number of skills in the areas of self-care, perceptual development (Schreibman, Koegel & Craig, 1977) and vocational education (Bellamy, Horner & Inman, 1979).

Interestingly, there has been relatively little research that directly investigates the social development of autistic persons. This is ironic since the central defining feature of autism is extreme social withdrawal. Previous work related to social development includes a study by Koegel and Rincover (1974) which taught autistic children to function effectively in a group of autistic students. Initially, the students were only capable of working in an individualized (one-to-one) instructional context. Egel, Richman and Koegel (1981) demonstrated that autistic students can imitate their nonhandicapped peers in order to learn a number of tasks. In a study more directly related to social interaction, Strain, Kerr and Ragland (1979) showed that peers can be trained to induce autistic students to interact with them in a free play setting. There is a larger research literature dealing with social skill training which has been primarily carried out with mentally retarded and behavior disordered children (cf., Strain & Fox, 1981). In these studies a normal peer was trained how to prompt and reinforce the behavior of a socially withdrawn child. The studies were successful since the normal peer became an effective instructor and the withdrawn child learned to emit a number of social play behaviors.

The bulk of past work on social training has taken place with preschool children (Guralnick, 1978). There are substantive and practical reasons for this development. Most importantly, the differences in social and cognitive abilities between handicapped and nonhandicapped preschoolers are proportionately less than their counterparts at the elementary and secondary school levels. In addition, university researchers have found easy access to laboratory preschools. Consequently, few procedures have been developed to teach social skills to secondary aged handicapped students. The present study examines social skill development between adolescent autistic and nonhandicapped students in a high school setting.

The prevailing tactic of past efforts has been to train a nonhandicapped peer to be the primary agent of social behavior change (Strain & Fox, 1981). A complementary strategy taken in the present study is to directly train the autistic student to initiate and elaborate interactions with their nonhandicapped peers. A complete social exchange can be broken down into initiation, elaboration and termination phases. Of these three components, the initiation phase has been the most thoroughly analyzed (Haring, 1978; Stokes, Baer & Jackson, 1974). Unfortunately, the training of initiation responses such as "Hi" and gestural waves tends to result in exchanges lasting for only a few seconds. There is a need to develop training packages that focus on the elaboration phase in order to promote longer duration exchanges. Most elaborations among normal persons tend to be conversational in nature. Because autistic persons characteristically have limited language repertoires, there is an inherent problem in relying on verbal discourse for elaborated encounters. The present study therefore selected nonverbal activities that could be used as a means to promote elaborated social encounters. The activities were of a social leisure variety. They were selected so that they would be reinforcing to both the autistic and the nonhandicapped student. The judicious selection of play materials has been shown to be an important precursor to cooperative or isolate play (Hendrickson, Strain, Tremblay & Shores, 1981; Quilitch & Risley, 1973).

The few studies using autistic students have been successful in training the <u>acquisition</u> of social skills in a specific setting (Ragland, Kerr & Strain, 1978; Strain et al., 1979). These same studies have been unsuccessful in promoting the generalization of social responses to different settings and persons. In explaining the appearance of generalized social responding in other populations, Strain, Shores and Timm (1977) pointed to the importance of imitation skills, verbal abilities and the presence of effective reinforcers in the target environment. The absence of these properties may preclude the generalization of social skills by autistic persons. The present study applied a "simultaneous" training procedure (Stokes & Baer, 1977) to promote generalization. Most social skill training studies in the past have used the dyadic model of exposing one withdrawn child to one normal peer. The present investigation simultaneously trained the autistic student with multiple exemplars (peers) in order to foster social initiations and elaborations with other students.

EXPERIMENT 1

Method

Two youths attending a class for autistic and severely handicapped students participated in the experiment. Both participants were diagnosed as autistic by an independent agency.

Mike was a 20-year-old who was characterized as socially withdrawn. During the previous two years he averaged five aggressive acts per year involving striking himself and others. He engaged in a high rate of self-stimulatory and inappropriate behaviors which included: humming, singing, facial grimacing, head jerking, patting women on the face and buttocks, hitting his finger tips against flat surfaces and stealing food and other objects. Mike had an expressive vocabulary of about 100 words. He could appropriately request: food items, the use of the bathroom and the desire to play tennis. Typically, however, he would state words out of context in a self-stimulatory manner. He could follow two- and three-step commands.

Mike was capable to performing a number of functional tasks for periods ranging from 15-30 min. He successfully held a work study job at his high school which required him to wash dishes and bus tables. He independently performed all basic self-care behaviors like toileting and dressing.

His social withdrawal consisted of several behavioral patterns. He rarely initiated verbal or nonverbal social interactions. He would respond "hi" to the greetings of others but he did not display spontaneous greeting behaviors. Upon approach by nonhandicapped or handicapped peers he would avoid eye contact and maintain a considerable distance from the other person. He would engage in leisure activities with others only when prompted to do so.

Mike functioned at the severely mentally retarded level of intelligence. Estimates made by psychologists of his intelligence quotient placed him in the 35-45 range.

Dan was a 17-year-old who displayed a number of aberrant behaviors that included: hand-biting, breaking objects, hitting peers and staff and loud vocalizations. He would appropriately request food, records and trips to stores. Dan was capable of a wide variety of independent tasks including: self-care skills, riding public transit, cooking simple meals and cleaning the teacher's lounge.

Dan's social withdrawal was manifested by his ignoring of handicapped and non-handicapped students. During his free time with peers, Dan typically ran through the crowd of people until he found an open area. He would then jump up and down and loudly vocalize to himself. He would respond "hi" to the greetings of staff members but would not spontaneously greet anyone. He occasionally (three times per week) initiated physical contact with staff members by tickling them, scratching their backs or touching their hands.

Dan functioned at the severe to moderate level of mental retardation. Psychometric evaluations indicated I.Q. scores that ranged between 30 and 55.

Setting

The investigation was conducted at a large suburban high school. A series of probe conditions were designed to observe the acquisition and generalization of social skills in a natural school setting.

Probe setting. Generalization probes were conducted in an outdoor courtyard (15 x 25m). Adjoining the special education classroom were three regular education classes. The courtyard contained four benches which were placed around a central planter. During regularly scheduled breaktimes, 8 handicapped and approximately 35 nonhandicapped students would gather in the courtyard.

The breaktime was unstructured for both groups of students. The nonhandicapped students in the courtyard represented a typical cross-section of the students attending the high school. Freshman, sophomores, juniors and seniors were present in equal proportions. Typically, the nonhandicapped students would spend their breaktime by "hanging out," e.g., stand in small groups, converse and smoke cigarettes.

The autistic students had been attending classes at the high school for two years prior to the study. The nonhandicapped students tended to pay little attention to either the self-stimulatory behavior or the social isolation behavior of the autistic students. If an autistic student did approach a group of nonhandicapped students, he was often greeted and welcomed into the group. Instances of ridicule or abuse were rare. Since the autistic and nonhandicapped students had been on the same campus for several years, some nonhandicapped students had learned the names of the autistic students and would greet them. Other nonhandicapped students in the setting had previously served as peer tutors in the autistic classroom. Thus, the composition of students who took their breaks in the courtyard consisted of those who had no previous experience interacting with autistic students (unfamiliar peers) as well as those who either served as peer tutors (peer tutors) in the past or had made an effort to interact with the autistic students on their own (familiar peers). The nonhandicapped students were completely blind to the experimental conditions and were not aware of the purpose of the data collection. The peer tutors in the breaktime setting were not involved in social skill training at any time.

Two generalization probe times were utilized, corresponding to two scheduled morning breaks. The generalization probes lasted for 15 min. A break lasting from 10:05 to 10:20 a.m. (time 1) was used from Tuesday to Friday for all phases of the study. In addition to the 10:05 breaktime, an additional break (time 2, 11:00 to 11:15 a.m.) was added during the social skill training phases. One or two observers stood in the courtyard, holding a stopwatch, and a pen concealed in the front pocket of a sweatshirt in order to make data recordings. Because of the large number of persons present in the courtyard during probe times the observers were able to remain unobtrusive and unnoticed.

Training settings. Training was conducted in both the generalization setting and the special education classroom. Training in the generalization setting occurred at different times than during the morning breaktimes. When training sessions occurred in the generalization setting, no nonhandicapped peers were present other than the peer trainers.

The special education classroom was 6 x 8m in size and contained a freetime break area (2 x 3m) where training sessions also took place. The break area had a sofa, rug, phonograph and a bookshelf containing a variety of games, magazines and records. The number of training sessions were evenly divided between the classroom setting and the courtyard setting.

Conditions

The participants were exposed to a sequence of five experimental conditions. The sequence of conditions was designed to layer in three components of extended social interactions in addition to providing a natural baseline condition.

For each of the conditions, generalization probes were run in the courtyard to evaluate the effect of the treatment. The condition probes occurred on the same days in which training occurred. The two baseline probes involved no training at another time of the day. Rather, the student was probed with or without possession of the leisure objects (see below). The three training probes all had the student carry an object. The type of object carried was randomly varied from session to session. After the initial no-object baseline condition, no-object probes were intermittently run through the remainder of the experiment.

No object baseline. The participants were first exposed to a natural baseline condition where they circulated throughout the courtyard during the morning break. The participants carried no special objects and were given no instructions during the probes. The measures were begun when the participating special education teacher gave the cue "take a break" and the participants entered the courtyard.

Object-only condition. The participants were sent to the courtyard for the breaktime probe with one of three objects and the same instructions to go take a break. The objects were selected because of their potential reinforcement value during interactions between autistic and nonhandicapped students. The students were given no instructions on how to operate the objects or how to socially interact with them. The condition served as an evaluation of the mere presence of attractive objects on social interaction.

The first object was a hand-held, video game called Pacman. Video games were popular among nonhandicapped students in this high school setting. The game could be learned by autistic persons and the hand-held version is portable so it could be used in a variety of breaktime settings.

The second object was a SONY Walkman FM radio equipped with a pair of stereo headphones. Many teenagers wore the headphones for listening to popular music both on and off the high school campus.

The third object was a pack of chewing gum. Gum was selected because it was noted that it was often used in the midst of a conversation to reinforce the other person and further established the intimacy of the interaction. Thus, the gum was portable and served as a potential reinforcer for the nonhandicapped student during the interaction. All three objects were selected because of their ability to reinforce nonhandicapped students during their interactions with autistic students. The objects also impacted on three different sensory modalities: visual (Pacman), auditory (Walkman), and gustatory (gum). The objects required little or no verbal discourse during an interaction and were thus suited to the communicative abilities characteristic of the autistic population.

Object function training. The object function training condition taught the participants to successfully manipulate the object. The participant was again sent out for the generalization probe with a particular object and the instructions to go and take a break. At another time of the day, though, he received one or two training sessions in the appropriate use of the object. The trainer met individually with the student and taught him how to: play Pacman, tune in and operate the Walkman radio and open and chew one piece of gum at a time without swallowing it when finished. The sessions consisted of five consecutive trials. The behavioral steps for performing each object activity were task analyzed and appear in Table 1. It can be noticed that the use of the object was taught as an isolated task and no related social skills were part of the task analysis. Each task was taught with a concurrent or total task training procedure (cf., Bellamy et al., 1979; Gaylord-Ross, Note 1). The trainer presented a cue to: "play Pacman," "listen to the radio" or "chew the gum." The student was expected to complete all of the behaviors in the task analysis in their proper sequence. Correct responses were positively reinforced with verbal praise. When there were five consecutive correct responses of a behavioral step, contingent reinforcement was dropped for that step. An error consisted of no response, a partial response, an incorrect response or a response out of sequence. Errors led to the immediate verbal and physical prompting of the correct response. Prompted responses were not reinforced.

Insert Table 1 about here

Training sessions began with one object. When the student reached 80% performance on one object, a second object was included during training sessions. The training trials then alternated between the two objects. Criterion was reached when the student attained three consecutive trials with no errors. The object was then no longer included in the training sessions. Mike was sequentially trained in Walkman, Pacman and gum. Dan's order of training was Pacman, Walkman and gum. The purpose of the object training condition was to investigate the effects of acquiring competence at manipulating an object on subsequent social interactions.

Social skill training. After the student had learned to appropriately manipulate the object, a social skill training condition was established to teach the social skills that would permit the autistic person to initiate and engage in social interactions with these objects with his nonhandicapped peers. Social exchanges may be analyzed into initiation, elaboration and termination phases. This training condition first taught the autistic student to approach a peer and make a greeting response. Next, the student offers to play with the object with his peer. If the peer responds affirmatively, they engage the object in a reciprocal fashion. Finally, a termination or farewell response is made to signal the end of the interaction.

Table 2 presents the task analyses of the three social skill training programs. The students received one or two training sessions per day. The sessions lasted about five min. Sessions were scheduled at least 15 min. prior to conducting generalization probe measures. Six trials were run in each session. However, the first trial in each session was conducted as a "retention" probe. That is, no prompts, corrections or praise were given on the first trial. All training trials began with the cue to "take a break." After the initial cue was presented the student had to produce each response in the chain in an accurate fashion. Correct responses were verbally reinforced and errors were verbally and physically prompted to produce responses in the correct sequence. The criterion for acquisition of the social responses was 100% correct for two consecutive sessions.

Insert Table 2 about here

In the training sessions, the social interactions were prompted between the autistic student and a nonhandicapped peer. The trainer was present to prompt and reinforce the exchanges. The peers used in training were selected on the the basis of a conceptual model to promote stimulus generalization. The CASE model developed by Horner (Horner, Sprague & Wilcox, 1982) utilizes a simultaneous training strategy (Stokes & Baer, 1977) to promote generalization. The student is exposed to multiple exemplars of a stimulus (in this case, nonhandicapped, adolescent peers). The training exemplars should contain the range of critical attributes present in the stimulus conditions where generalization is to take place. In this case, the training peers were in the tenth, eleventh or twelfth grade (age variation). They were either known or unfamiliar to the autistic student (variation across the familiarity dimension). The participant was exposed to six peer trainers (two male and four female) who were rotated across the social skill training sessions. The peer trainers were never present during generalization probes. During a given session only one peer tutor was employed.

Before the first training session the peer was presented with a verbal and written description of the training procedure. The peer was shown a script of how he or she was to respond to the social behaviors of the autistic student (see Table 3). The trainer and the peer role-played the exchange prior to the first training session. The trainer thereafter monitored peer and autistic student behavior. Peers learned their scripts fairly easily and there was no need for extra training.

Insert Table 3 about here

Maintenance. Four months after training conditions were terminated the participants were again handed an object and given the cue to take a break. As during the object only baseline, the participants were given no instruction or prompts on how to operate these objects or how to interact with the nonhandicapped students. In other words, aside from the passage of four months wihout any training, the maintenance probes did not differ from the generalization probes.

Measurement

During the 15 min probe period an observer recorded a number of social behaviors. The observer was familiar to the regular and special education students in the courtyard. The observer stood at least 5m away from the participants during the probe sessions. Mike and Dan were observed simultaneously. Only social events enacted between the participants and the nonhandicapped peers were recorded. Three classes of dependent variables were recorded during the generalization probes.

Social initiation. A social initiation was defined as one student approaching within one m of another student, orienting their body toward the other person and making a verbal or gestural response which would indicate purposeful communication, e.g., exchanging an object, conversing or touching one another. Initiation behaviors which did not lead to an acknowledgement from the other person were not scored as social initiations, since a response without some acknowledgement by another person cannot be considered a social behavior. Acknowledgement behaviors included verbal replies, gestural replies, handling objects, changes in head or body orientation or making eye contact with the social initiator. Behaviors that appeared to be self-stimulatory or non-communicative were not scored as social initiations. Social initiations were coded as either "autistic student initiations" or "nonhandicapped student initiations" depending on which student initiated the interaction. The total number of autistic and nonhandicapped student initiations were separately tallied for each participant at the end of the probe session to produce four frequency scores.

Duration. Whenever an interaction was initiated, the observer started a stopwatch. The stopwatch was turned off at the end of the interaction. An interaction ended whenever the targeted participant or the nonhandicapped student shifted attention to another person or moved 1.5m away from the interacting student. The observer carried two stopwatches in case the participants were having simultaneous interactions; although this never happened. At the end of the interaction the observer recorded the duration and type of social initiation that had occurred. The number of seconds of interaction was summed at the end of a session to produce a duration score for each participant.

Descriptive information. A variety of descriptive information was recorded in addition to the initiation and duration data. Whenever an interaction occurred, the observer recorded the name of the nonhandicapped peer who took part in the social exchange. The nonhandicapped peer was categorized as a peer tutor (however, not a peer used during social training), a familiar peer or a nonfamiliar peer. The observer also noted whether the interaction was centered around any object. Object-centered interactions were defined as social events which involved the offering and exchange of the video game, Walkman or gum. Non-object-centered interactions were defined as social interactions involving verbal exchanges of information, requests for food, or other responses not directly trained within the study.

Reliability. A second observer performed reliability checks in the generalization probe setting. Four individuals who were graduate students in special education served as reliability observers. The observers were trained to use the instrument by scoring social behaviors in a similar breaktime setting prior to participation in the study. The second observer stood unobtrusively in the courtyard at least 5m away from the primary observer. There were two to four checks in each probe condition. At a minimum, reliability probe sessions were scheduled immediately before and after changes were made in the experimental conditions. Agreement was evaluated on a point-by-point basis (Kazdin, 1982, p. 54). That is, the agreement or disagreement concerning the occurrence of a social behavior was determined for every discrete social event. For example, when observer 1 saw Dan wave hello to a specific nonhandicapped peer at 2 min 3 sec into the session and observer 2 recorded the same event at that time, that was an agreement. If observer 1 recorded that event at that time but observer 2 did not, that was a disagreement. The formula used to calculate the average agreements was:

$$\text{point-by-point agreement} = \frac{A}{A + D} \times 100$$

where A = # agreements that a social event occurred

B = # disagreements that a social event occurred

Calculations of interobserver agreement using the point-by-point agreement formula are considered to be appropriate when behavior occurs at a low frequency, because with low frequency behaviors the probability of "chance" agreements are negligible.

The reliability of the duration data collected during the generalization probes was calculated with the ratio formula described by Kazdin (1982, p. 52):

$$\% \text{ agreement} = \frac{\text{smaller \#SEC}}{\text{larger \#SEC}} \times 100$$

The percent agreement was calculated for each instance of a social event. For instance, if observer 1 saw Dan wave to a specific peer at a given time for 10 sec and the second observer recorded the duration of that event to be 5 sec, the event agreement would be 50%. Then, the mean of the precentage agreements of events across a session was calculated. Events in which both observers did not agree on their occurrence were not included in these calculations. Summary data are reported in Table 4. Reliability coefficients were obtained in 34% of the generalization probes for Mike and in 39% of the generalization probe sessions for Dan.

Insert Table 4 about here

The reliability of the training data was assessed with nine reliability checks for each participant. The method and formula for evaluating the reliability of the training data was the same as that used to evaluate the frequency of interaction data collected during the generalization probes. The percentage agreement coefficients attained during the training sessions appear in Table 4.

Design

A multiple baseline design across stimuli was utilized to demonstrate the functional control of the social skill training package over the participant's acquisition of the approach, initiation, exchange and termination responses. Baseline probes, conducted within the training setting, were taken across all three objects. The trainer handed the participant the object and gave the cue to take a break. The nonhandicapped teenager, pretrained with the script from Table 4, was seated in the courtyard reading a magazine. The trainer recorded the number of responses from the task analysis (Table 3) for the particular object that the autistic student displayed. Upon entering the courtyard setting the trainer watched from a distance of 8m and recorded all correct responses whether in sequence or not. The trainer offered no prompts or reinforcers during baseline. After a sufficient number of baseline sessions indicated that few of the social behaviors were spontaneously produced by the participant, social skill training with each of the three objects was sequentially lagged in. Performance was measured by tallying the number of correct responses in each trial as per baseline measures.

The generalization probes were lagged in sequentially as training proceded with successive objects. First, a series of no object baselines were run. Again, at later phases of the experiment no-object probes were intermittently presented in order to evaluate whether social responding would occur in the autistic youth without possessing the trained object. After the initial no-object baseline a series of object baseline probes were run to evaluate the effect of possessing the object without knowing how to use it. Next, a series of object probes were run after object function training began. Finally, following social skills training, object probes at times 1 and 2 were alternated across sessions. There was some overlap between object baseline probes and object function probes for the following reason. When object function training began with Pacman, for instance, subsequent probes with Pacman were labeled object function but gum and Walkman were still in the object-only baseline, since no training had begun with these objects. Subsequently, when object function training began with Walkman, probes with Walkman (and Pacman) were labeled object function while yet-to-be-trained gum probes were still object-only baseline. Finally, gum was trained and all probes were object function. The same overlapping of object function and social skill probes occurred when the objects were sequentially added during social skill training.

Results

The effectiveness of the social skill training package is demonstrated in Figure 1. The percentage of correct responses for Dan in the social skill analyses for the maintenance probe trials is plotted in the baseline and training conditions. The profile of Mike's acquisition of the social behaviors across the three objects was nearly identical to Dan's but is not graphically displayed here. Both Dan and Mike displayed steady baseline levels of performance that ranged between 5% and 50%. This nonzero level reflects the skills that they had already learned in manipulating the objects in the object training condition. In baseline there was still an absence of the social skills enumerated in the task analyses. When social skill training was introduced there was an immediate and substantial increase in performance in the retention trials across all three objects for both students. Figure 1 shows how training and retention trial performance stabilized at the 80%-100% level. It can be inferred that the social skill training package was responsible for the acquisition of the approach, greeting, distance maintenance, and termination responses in both Dan and Mike.

Insert Figure 1 about here

An analysis was made of the generalization of social skills during the unstructured breaktime. Figure 2 presents the cumulative number of AI responses by Dan across generalization probe sessions. Baseline (no object) probes produced no responses throughout the study. The 16 sessions of the object-alone condition produced only one self-initiated response. Similarly, during the 18 probes of object training only one initiation response was observed. Next, the social skills training did produce a substantial amount of generalized responding. There was a total of 16 responses in 17 sessions. In the last condition of the experiment, it was decided to run additional generalization probes at a second break time. The six "time 2" probes (vs. the 10 a.m., "time 1" probes) resulted in 15 responses across six sessions. Therefore, the rate of responding in time 2 probes was about three responses per session, which exceeded the time 1 rate by three fold.

Insert Figure 2 about here

The generalization of AI responses for Mike also appears in Figure 2. Again, there was no responding during initial baseline sessions. Interestingly, generalized responding did occur in the first two no-object probes that were taken later during the social skill training phase. Thus, when Mike learned social approach, elaboration and termination behaviors with objects, he generalized them to circumstances when he carried no objects. In contrast to Dan, Mike did emit some AI behaviors in the object-only baseline and object training conditions. The rate of responding was low, though; four responses per session in the object-only baseline condition and eight responses per session in object training. The social skills (time 1) training probes showed a substantial amount of AI responding (two initiations per session). The time 2 probes also produced a rate of two initiations per session. As with Dan, a substantial rate of generalized responding occurred only after Mike had attained criterion in the social skills training sessions.

A further analysis was conducted on the duration of AI interactions and the type of object used in these occurrences. Figure 3 shows that the only substantial duration of responding (in cumulative number of sec) for Dan was with the Pacman and Walkman objects. All of these probe sessions occurred during social skill training except for one object training probe with Walkman. The duration of the generalized responding which occurred with gum was shorter in comparison.

Dan's data included all AI interactions that were centered around the interactive object and those that were not. In Dan's case, almost all interactions were object centered so that the graphs for all AI interactions (Figure 3) versus object-centered only interactions would be nearly identical. In contrast, Mike's interactions differed between the total AI interactions and those initiated only around the trained object.

Insert Figure 3 about here

Figure 4 shows that for Mike, in the Walkman probes, substantial social initiation did not occur until social skill training was begun. However, only about half of the total AI interactions were centered around the object. This is consistent with Mike's AI data in the no-object, baseline probes of social skill training (see Figure 3). There, AI responses appeared in the absence of the trained objects. Similarly, the data from Pacman shows that none of the AI interactions were centered around the object. Yet, the other social behaviors trained like approaching, posturing and greeting appeared in the generalization probes. The gum object produced consistent but short duration interactions that were object centered.

Insert Figure 4 about here

An analysis was completed concerning who the autistic students initiated toward. It was found that through the entire study Dan initiated interactions with peer tutors 20 times, familiar, non-peer tutors 19 times and unfamiliar students on 14 occasions. Mike initiated interactions with peer tutors 29 times, familiar, non-peer tutors 30 times and unfamiliar students 14 times. Throughout the study Dan initiated interactions with 28 nonhandicapped students and Mike interacted with 33 nonhandicapped students. Thus, Dan and Mike tended to select familiar students to interact with. This data was not controlled, though, and must be interpreted with caution. Students who were familiar tended to spend more time in the courtyard and were, therefore, more available to interact with. Also, there was no control put on the number or proportion of familiar and unfamiliar students in the courtyard at a given time.

Interactions initiated by the nonhandicapped students were separately analyzed. With Mike, the nonhandicapped peers initiated interactions with the following means (number of interactions per session): no object baseline = .67, object only baseline = .71, function training = 1.2 and social skill training = 1.5. Thus, when comparing the social skill training data to the initial no object baseline data, Mike was approached more than twice as frequently after he was trained to manipulate and offer the objects. Dan's data produced a contrasting pattern of results. During the no-object baseline condition, Dan received a mean of .11 initiations by the nonhandicapped students. A mean of 1.8 was observed during the object-only baseline condition, 1.5 during function training and .88 during social skill training. Although Dan became somewhat less "popular" as the conditions were progressively layered in, he was eight times more likely to be approached during the final condition of the study than he was during the initial, no object baseline condition. To summarize, both participants received substantially more initiations from the nonhandicapped students after they were trained to manipulate the objects and initiate social interactions with them. Throughout the study, nonhandicapped students initiated social interactions on 85 occasions with Mike and on 41 occasions with Dan.

Finally, a series of maintenance probes were run with Dan and Mike four months after the cessation of training. The probes were run in the same courtyard setting at breaktimes for 15 min periods with the Walkman object. On two probes Dan initiated one interaction for 222 sec and one interaction for 316 sec. In one probe Mike initiated no interactions.

Discussion

Experiment 1 demonstrated that social skill sequences with differing objects can be successfully taught to autistic youth. Furthermore, when a variety of persons (training exemplars) are used, there can be a considerable amount of generalized responding in nontraining contexts. The success of the social skills training package was highlighted by the consistent functional relationship of bringing a student to training criterion and there being an immediate increase in generalized responding. The consistency of effects across objects and students further supported the efficacy of the training package. Dan and Mike did learn to approach and interact with nonhandicapped students at the rate of one to three interactions per break. In addition, during the interactions that lasted one to three min, even when the interactions were not object centered (e.g., Mike - Pacman), the student emitted pertinent social behaviors to sustain an interaction.

The social validity of the behavior change could be inferred by examining the frequency of initiations by the nonhandicapped students. The NH initiation data for Mike and Dan indicated that, compared to object baselines, considerably more initiations occurred when the objects, object function and social skill training conditions were introduced. Although these data do not indicate how the students "felt" about the interactions, they do indicate that the autistic students were perceived as more desirable to interact with as a function of the intervention.

In addition, it should be pointed out that the objects themselves were initially selected because of their interest to the nonhandicapped students. That is, before the study began observations were made of the NH students at the high school and it was found that many of them listened to Walkman radios and shared food during breaks from classes, as well as playing video games at off-campus arcades.

Finally, it is possible that the experimental design of gradually layering in object training and social skill training after baseline may have inhibited generalization. The participants may have developed a pattern of not responding in the probe setting because they had extensive experience manipulating the objects during the object-only baseline prior to any social interaction intervention. In fact, higher frequencies of generalized initiation were observed during the second generalization probe time where the participants had not undergone repeated sessions of nonresponding.

EXPERIMENT 2

A second experiment was designed to replicate the effects of the training package with another autistic student. In addition, the experimental design and treatment package were altered to control for the problem of repeated baseline measures. Also, the object training phase was combined with social skill training.

Experiment 1 showed that object training had little influence on the social aspects of social skill training. From a practical point of view, teachers are more likely to teach the social and object manipulation behaviors at the same time.

Method

Participant

Jim was an 18-year-old student who attended the same special education class as the participants in Experiment 1. He was diagnosed autistic by an agency independent from the staff conducting the study. He displayed a number of self-stimulatory behaviors on a daily basis that included body rocking, hand waving, grimacing and twirling fingers in front of his face. Jim would voluntarily speak to request food items. He could follow two-step commands and had a receptive vocabulary of about 200 words. He could successfully work on a task for 20-30 min. He would greet familiar persons by putting his hand out to gesture hello. He would not spontaneously say "hi" to others. Jim would approach familiar persons at times and place his face a few cm from the face of the other person. After a couple of sec of this behavior he would often run away from the person with a gleeful laugh. In most social situations Jim would isolate himself. When he was in proximity to others he rarely oriented his body in a proper frontal manner; he rarely gave eye contact.

Procedure

Separate generalization and training sessions were conducted. Training sessions occurred in both the courtyard and classroom settings. Training sessions were separated by at least one hour from generalization probes. Jim was trained to manipulate and socially initiate with three objects; a hand-held "Galaxian" video game, a Sony Walkman with two stereo headphones and gum. The order of exposure to the objects was gum, Walkman and Galaxian. All probes and training sessions were begun with the cue "go take a break."

Generalization data were collected using the same response definitions as in Experiment 1. The probes were taken daily at lunchtime and lasted for 15 min. Previous to training a series of no-object baseline probes were run. During training no-object and object probes were run in alternating fashion. Toward the end of the condition only object probes were presented. A total of 12 reliability checks were made across the baseline and training conditions. Interobserver agreement was calculated in the same manner as in Experiment 1. The percentage of agreement for the frequency of autistic initiations and frequency of nonhandicapped initiations was 100% on all checks. The range of the percentage agreement scores for the duration data was 92% to 100% with a median of 96%. There was 100% agreement for who the interactants were and whether the interaction was object-centered or not.

Design

This study used a multiple baseline design across the three objects for training with concurrent generalization probes. Jim was first exposed to a baseline condition in the classroom and courtyard settings. He was given an object and a cue to take a break. The trainer then counted the number of responses from the task analysis for each object that Jim produced regardless of their order of appearance. No prompts or reinforcers were given.

Approximately half of the training sessions were conducted in the special educatio -lassroom and half in the courtyard. During all training sessions one nonhandicapped female peer was present within 5m of Jim. The same peer served in the experiment on a daily basis so that only one person (exemplar) was used in Experiment 2. As before, the peer was pretrained using a script of possible social responses. The script for Walkman and gum were identical to that in Experiment 1. The script for Galaxian was identical to the script for Pacman in Experiment 1 (see Table 4 and insert Galaxian for Pacman). Following baseline, social skill training was sequentially introduced in a multiple baseline fashion. As in Experiment 1, each training session began with an unprompted and nonreinforced retention trial.

The gum and Walkman social skills training wese identical to that in Experiment 1 (see Table 3). A different videc game, Galaxian, was used in this experiment. Table 3 presents the task analysis of this game. The same prompting and reinforcing procedures used in Experiment 1 were applied to teach these three tasks. The only difference between experiments was that the manipulation of the objects was taught with the social skills.

Reliability data on the social skills training were collected in the same manner as in Experiment 1. There were 10 reliability checks on the accuracy of scoring the steps in the task analyses. Interobserver agreement was 100% on all checks.

Results and Discussion

Jim successfully learned the social skill sequences for the three objects. He sustained about a 10-20% correct level of responding in the baseline trials. In the training condition his training and retention trial performance gradually increased to the 90-100% level. The profile of acquisition of the social behaviors across the three objects was similar to Figure 1.

Jim displayed a substantial rate of generalized social (AI) responding (see Figure 5). During the no-object baseline condition there were no initiation responses. When the training package was introduced, generalized responding both with the objects and without the objects (baseline probe) was observed. The duration of the interactions was also substantial. Figure 6 shows the cumulative number of sec of interaction across training conditions and object type. There was much interaction with Galaxian and gum. There was little interaction in the initial baseline and Walkman. Interestingly, no-object (baseline) probes run after social skill training had been instituted produced a frequency of initiating social interactions (1.14 per break) which was similar to the frequency produced when Jim had objects (1.06). Thus, Jim was interacting with his handicapped peers (approaching, speaking) even when he did not carry a breaktime object. The mean duration of the no-object probes during the social training condition was 11.2 seconds. Similarly, when Jim was probed with gum, he rarely used the gum to initiate social behaviors as he would usually consume the gum himself. Instead, as in the no-object probes, Jim approached, greeted and positioned himself in proximity to peers and, at times, conversed with his peers. His mean duration of interaction was 27.4 sec/session with gum, 14.5 sec/session with the Walkman and 155.6 sec/session with the Galaxian video game.

Insert Figures 5 and 6 about here

Like the students in Experiment 1, Jim tended to interact with students who were familiar to him. Across all sessions he had the following number of interactions: peer tutor = 29, familiar, non-peer tutor = 10, unfamiliar peer = 2. Again, these results must be interpreted with caution because of the lack of control of the peers in the courtyard setting.

In contrast to Experiment 1, there were systematic differences in the nature of the interactions initiated by nonhandicapped peers. There was little time spent interacting in the baseline probes (both initial or extended). Figure 6 shows that there was a substantial amount of time in NI object probes after training had been instituted. The interactions were object-centered for Walkman and Galaxian but not for gum. For example, peers approached Jim and they initiated an interaction by requesting to see the radio or videogame. The peers approached him when he had gum but no sharing of the object occurred. Yet, social interactions transpired (greetings, conversation).

Finally, a maintenance probe lasting 15 min that used the Walkman object was run in the courtyard four months after the completion of training. Jim initiated one interaction (which lasted 46 sec) in the session.

GENERAL DISCUSSION

Persons referred to as autistic are characterized by their socially withdrawn style of behavior. The three youth in these experiments had spent from one to three years in a highly "integrated" school setting where they had substantial daily contact with nonhaniicapped peers. In spite of this contact the autistic students initiated essentially no interactions with their peers before a training procedure was instituted. The absence of social interaction between handicapped and nonhandicapped students prior to training is in agreement with previous work on this topic (cf., Guralnick, 1978).

In order to encourage social interaction with their peers the autistic students were given objects which were appealing to their nonhandicapped peers and that required little or no verbal explanation. It was found that in a free play setting the mere possession of the attractive object or separate training in how to use it did not lead to social initiations and interactions by the autistic students. It was necessary to train the students in the related social skills of greeting, positioning, etc., before they began to initiate and sustain interactions with their peers.

The training procedure proved quite successful in teaching the acquisition of social skill sequences. Within the training context the youth initiated and sustained interactions with a variety of persons and play objects. Attention should be given, though, to the types of students with which this procedure could be used. Participants were functioning at the severe and moderate levels of retardation. They were capable of learning the multiple-step social sequences in a rapid and simultaneous fashion. Students with more profound handicapping conditions may have cognitive disabilities that would limit their learning of the social sequences in the manner presented here. The sequence may have to be taught in a slower, serial manner rather than with the total task, concurrent procedure used here. Also, the video games like Pacman and Galaxian may require too much cognitive processing for students with lesser intellectual abilities.

The most impressive finding in the study was that there was a considerable amount of social responding by the participants during the unstructured breaks. The autistic youth were initiating interactions with nonhandicapped peers at a rate of one to three encounters in a 15-min break period. The interactions also lasted for a substantial duration (.5 to 3 min) and were centered either around the play objects or other pro-social activities like simple conversation. The successfu. training of longer duration encounters extends previous work that taught brief greeting responses to retarded and autistic persons (Haring, 1978; Stokes et at., 1974).

Part of the success of the generalization training procedure may be due to the use of multiple training exemplars (persons). In training, the autistic youth was exposed to different nonhandicapped peers across trials. This simultaneous training (Stokes & Baer, 1977) or systematic variation of persons led the student to generalize his social responses to other peers in the probe setting. Previous work which failed to produce generalization of social behavior among autistic persons has used a single exemplar training approach, i.e., one autistic student with one nonhandicapped student. Yet, our conclusion must be qualified since multiple person training occurred only in Experiment 1 but not in Experiment 2. In Experiment 2 there was successful generalization with Jim being exposed to the same peer throughout training. Part of Jim's success with a single training peer was that he was considerably "higher functioning" than the participants in Experiment 1. He had more social and language skills prior to the onset of the study than Mike or Dan. Thus, single-person training might have been sufficient to produce generalization given his social and cognitive abilities. We do not, of course, know whether single-person training would have been successful with Mike and Dan since they were only exposed to the multiple exemplar case. Certainly, future research should investigate the number of training persons necessary for the generalization of social behaviors among autistic persons.

It should be remembered that the generalization of social behaviors in the present study was across persons (and time) but not settings. The probe setting was in the same courtyard at different times of the day. Within this setting the autistic youths tended to approach and interact with familiar peers. These were peers with whom they did not receive social skills training but students who spent considerable time in the special education classroom and/or the probe courtyard. The tendency to interact with familiar peers may explain the inconsistency in the maintenance data. Two out of three of the participants showed maintenance of the social interaction skills four months after training. Four months had elapsed because training was terminated at the onset of summer vacation. The maintenance probes were taken the following fall. As a consequence, many of the familiar peers from the year before were not present in the fall. Therefore, the failure of Mike to demonstrate maintenance of the social skills could be due to forgetting the skills in the summer or to changes in the population of nonhandicapped people in the courtyard.

In terms of social validity it is important to identify the types of settings and persons that are targeted for stimulus generalization. In the social behavior domain, it is not desirable to have handicapped persons approach any person in all settings in order to socially interact. Unwanted outcomes could accrue from such overly generalized response tendencies. Rather, it is more appropriate for individuals to, by and large, interact with familiar persons in familiar settings. In the present study the autistic youths did approach familiar peers in a given familiar settings. Future educational and research efforts should give attention to the types of settings or subenvironments in which social responding is to occur. In a person's typical day there are contacts with familiar persons in familiar settings, e.g., the corner newsstand. the "ma and pa" store. Within these subenviroaments it is appropriate to initiate social contacts. In more transient settings, like public restrooms, it is generally not advisable to approach unfamiliar persons. It can be seen that a comprehensive understanding of the socialization of autistic persons will include a delineation of the subenvironments where social behaviors are promoted (generalized) and a designation of those settings where generalized social responding should not take place (Haring & Baldwin, Note 2). When describing these social subenvironments it is important to keep abreast of what is fashionable and of interest to the nonhandicapped peer group. Video games and radios were used here as vehicles to promote extended interactions. With other age groups or with changing fads the types of play objects used may differ. The key factor is that objects should be selected that are likely to be reinforcing to both the handicapped and nonhandicapped person. If the reinforcement preferences of the nonhandicapped peer are not considered, there is little likelihood that this individual will sustain interactions in a generalization setting where no external reinforcers are delivered by a teacher or therapist for interactirg with a handicapped person.

When considering the dyadic nature of social interaction it should be remembered that the present study only focused on the training of the handicapped youth to be an initiator and sustainer of interactions. Some previous work has lodged all of the training efforts with the nonhandicapped peer (for a review of this work. ee Strain, 1981). It would, of course, be possible to have a training package that intervened with both members of the dyad (cf., Baldwin, 1983). Future research should investigate the different member components of a social skills training package that will maximize a natural reciprocity of social exchanges (Piaget, 1951). Also, the role of the object in facilitating social interaction should be studied. Quilitch and Risley (1973) found that certain types of objects facilitated cooperative play and others led to isolate play. Here, certain objects led to longer duration interactions than others. It was assumed that the object served as a social "prosthetic" to faciliate interaction among peers who ordinarily had no common language or cultural base to build interactions around. While the play objects served this function, there were other instances where non-object-centered interactions seemed to evolve from the social behaviors that had been learned by the autistic youth. For instance, Jim emitted social responses in the no-object probe after he received social skill training. He also emitted social responses in object probes that did not revolve around the object, e.g., greeting, approaching, conversing, but not playing Galaxian. Similarly, Mike emitted many social behaviors in object probes that did not center around the play object. Dan differed in this regard in making almost all of his social responses object centered in the probes. Thus, the individual differences in social behavior across youth could be due to endogenous differences in cognitive or social development or some characteristic of the treatment package. At present it can be stated that the social skills training package successfully produced generalized responding but it is not clear whether the play objects were essential in producing this effect. In conclusion, the relation between object, training and related variables appears to be a fertile ground for future research to investigate the most effective ways to promote the social development of autistic persons.

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Table 1

Task Analyses for Object Training

Pacman

1. Turn on machine.
2. Press start.
3. Make Pacman move down.
4. Change direction at wall.
5. Run away from ghost.
6. Read score.
7. Turn game off.

Walkman

1. Turn on radio.
2. Adjust volume control to level 6.
3. Put headphones on.
4. Select rock station.
5. Change station at the beginning or end of a song.
6. Change station at a commercial.
7. Turn off radio and remove headphones.

Gum

1. Take stick of gum out of pocket.
2. Unwrap gum.
3. Put gum in mouth.
4. Chew for 15 sec without swallowing. Successively increase time criterion to: 30 sec., 1 min., and 3 min.
5. Throw gum away into a receptacle.

Table 2

Task Analyses for Social Skills Training

Pacman

1. AS approaches NS.[a]
2. AS establishes one m proximity.
3. AS establishes a face-forward orientation.
4. AS says "hi."
5. AS waits for response.
6. AS says "want to play?"
7. AS waits for response. AS finds someone else if NS does not indicate willingness to play. AS then begins sequence at step 1 again.
8. AS turns game on.
9. AS hands game to NS.
10. AS watches NS play.
11. AS receives game from NS.
12. AS reads NS score.
13. AS turns game off.
14. AS turns game on to reset score to zero.
15. AS plays game (see steps for playing Pacman in Table 2).
16. AS reads own score.
17. AS offers game to NS. If NS accepts, play continues in alternating fashion. When NS indicates s/he is finished, AS takes game back.
18. AS says "bye."

Walkman

1. As approaches NS.
2. As establishes one m proximity.
3. AS establishes face forward orientation with NS.
4. AS says "hi."
5. AS waits for response.
6. AS says (and writes[b]) "wants to listen."
7. AS shows radio to NS.
   a. If NS not interested in interacting, AS approaches another student (step 1).
8. AS turns on radio.
9. AS adjusts volume to level 6.
10. AS hands headphones to NS.
11. AS puts on headphones.
12. AS selects rock and roll station.
13. AS remains in proximity to NS until termination of interaction by NS.
14. AS says "bye."

Table 2
(continued)

Gum

1. AS approaches NS.
2. AS establishes one m proximity.
3. AS establishes a face-forward orientation.
4. AS says "hi" to NS.
5. AS waits for a response.
6. AS says (and writes[b]) "what are you doing?"
7. As waits for a response.
8. AS says (and writes[b]) "want some gum?" and shows pack of gum.
9. If NS says yes, AS hands pack of gum of NS.
10. NS hands pack back to AS.
11. AS selects a stick of gum and chews it until the end of the interaction.
12. As remains in one m proximity to NS for at least 30 sec or until end of interaction.
13. As says "bye" when NS terminates the interaction.

Galaxian

1. AS approaches NS.
2. AS establishes one m proximity.
3. AS establishes face-forward orientation to NS
4. AS says "hi."
5. AS waits for a response.
6. AS writes and says "want to play."
7. AS shows message and game to NS.
8. If NS indicates no, AS goes to another student (step 1).
9. AS turns on game.
10. AS hands game to NS.
11. AS looks at game for 10 out of every 15 sec NS is playing.
12. AS receives game from NS.
13. AS says NS score.
14. AS turns game off.
15. AS turns game on.
16. AS depresses right directional dial with right hand.
17. AS repeatedly depresses fire button with left hand.
18. AS depresses left directional dial with right hand.
19. AS reads own score at end of game.
20. AS offers game to NS. Steps 11-20 continue if NS indicates interest in playing.
21. AS says "bye" when NS ends interaction.

[a] AS = autistic student, NS = nonhandicapped student.
[b] Applies only to Jim, who would write on a notebook the words he was saying and display the notebook to the NS.

Table 3

Training Scripts for Nonhandicapped Peer and Autistic Student

Autistic Student[1]	Nonhandicapped Peer[2]
Pacman	
1. "Hi."	
	2. "Hi, ______, how are you doing?"
3. "Fine."	
4. "Want to play Pacman?"	
	5a. "Sure (yeah, great)" or b. "No, thanks."
6. Turns on game.	
7. Hands game to NP.	
	8. Plays game until it is over.
	9. Hands game to AS.
10. Reads score.	
11. Turns game off and then on and plays.	
	12. Watches while AS plays; encourages him when AS plays well.
13. Reads his own score at the end of the game.	
14. Offers game to NP.	
	15. Plays game or says "No, thanks, got to go, bye."
16. Says "bye."	
Walkman	
1. "Hi."	
	2. "Hi, how are you?"
3. "Fine."	
4. "Want to listen?"	
	5a. "Sure." or b. "No, thanks."
6. Turns on Walkman.	
7. Sets volume to 6.	
8. Hands headphones to NP.	
	9. Puts headphones on.
10. Turns to rock 'n roll station.	
	11. Listens or tells students to change station and then listens
	12. Gives headphones back to AS and says "bye."
13. "Bye."	

Table 3
(continued)

Autistic Student	Nonhandicapped Peer
Gum	
1. "Hi."	
	2. "Hi."
3. "What are you doing?"	
	4. "Just sitting around, (not much, waiting for someone)."
5. "Want some gum?"	
	6. "Sure (yeah)."
7. Hands stick to NP.	
	8. Takes stick of gum and says "thanks."
9. "Sure."	
10. Chews gum.	
	11. Talks to student. Asks him "What did you to yesterday? What are you doing after school?.."
12. Responds to questions from NP.	
	13. Hangs out for one to three min.
	14. "Bye."
15. "Bye."	

[1]AS = Autistic Student.

[2]NP = Nonhandicapped Peer.

Table 4

Interobserver Agreement for Training and Generalization Sessions

	Student	Number of Checks	Range	Median	Mean
Frequency of Interaction (generalization)	Dan	15	50-100%	100%	93%
	Mike	17	50-100%	100%	97%
Duration of Interaction (generalization)	Dan	15	61-100%	98%	94%
	Mike	17	35-100%	85%	84%
Behavioral Steps (training)	Dan	10	all 100%	100%	100%
	Mike	12	all 100%	100%	100%

Figure Captions

Figure 1. The percentage of responses completed in the task analyses of social interaction behaviors for Dan.

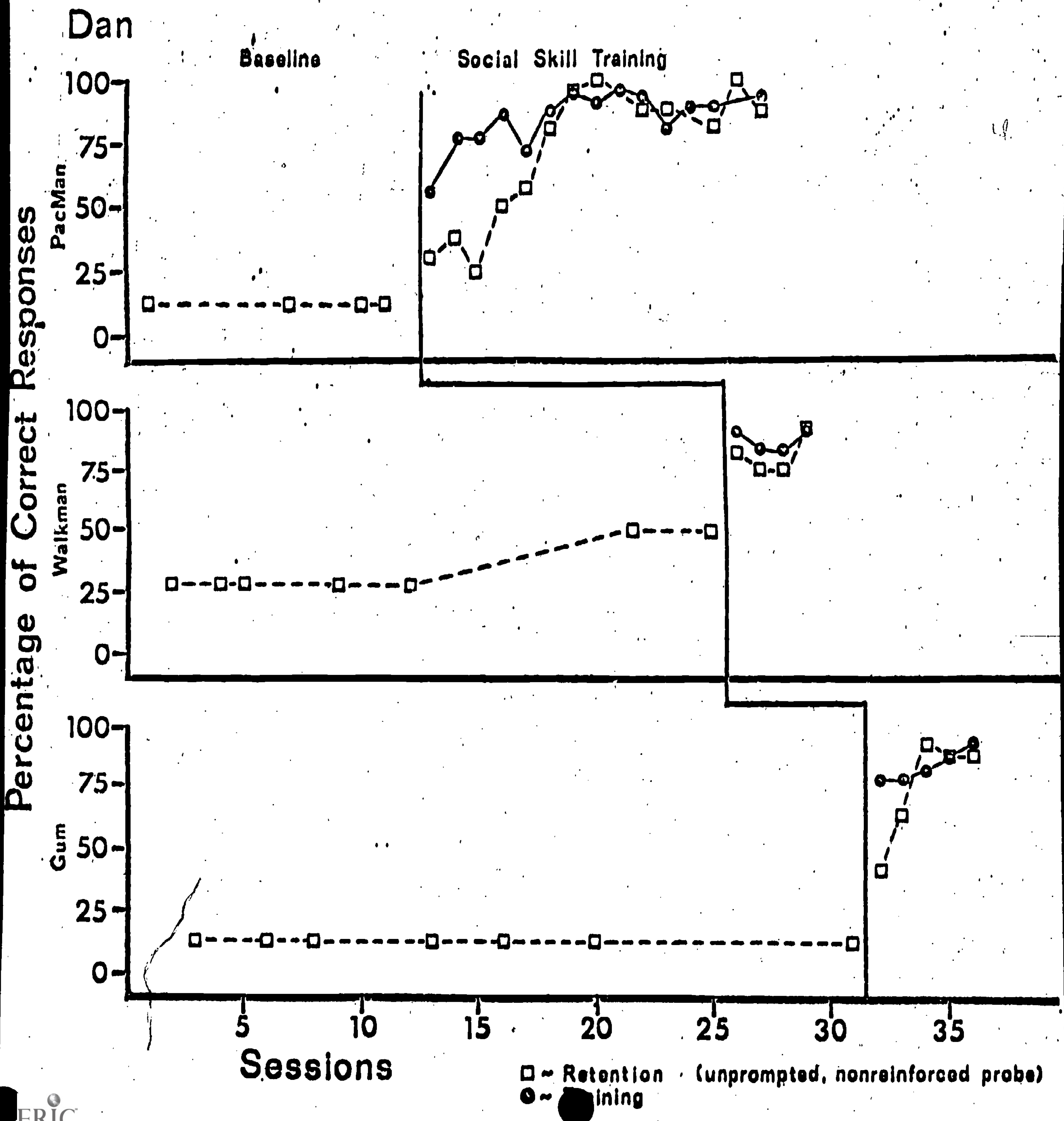
Figure 2. The cumulative numbers of social initiations for Dan and Mike in the four probe conditions.

Figure 3. The cumulative sec of autistic initiated interactions with each object for Dan.

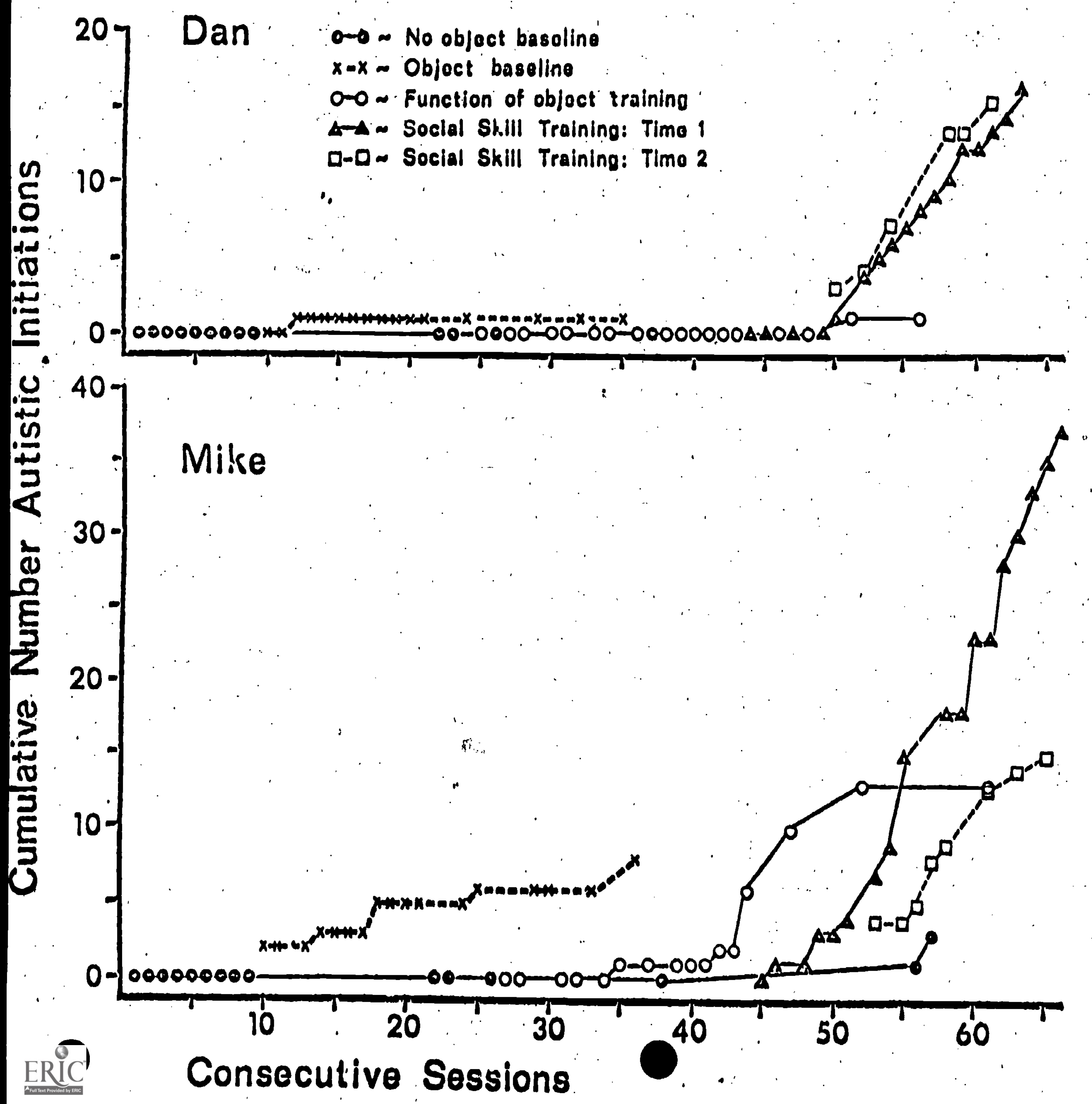
Figure 4. The cumulative sec of autistic initiated interactions with each object for Mike.

Figure 5. The cumulative number of social interactions for Jim.

Figure 6. The cumulative number of sec of autistic initiated and nonhandicapped peer initiated interactions with each object for Jim.

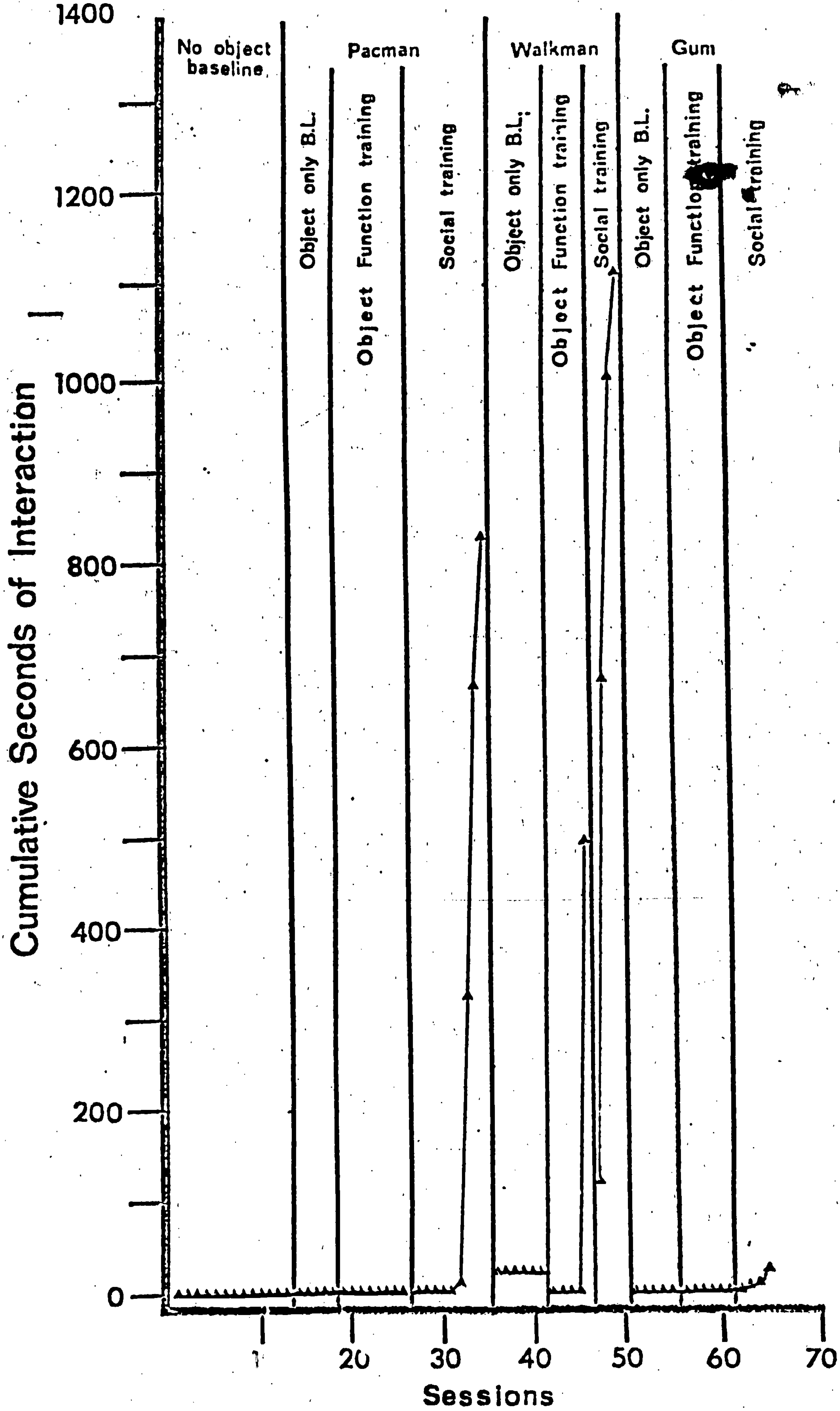


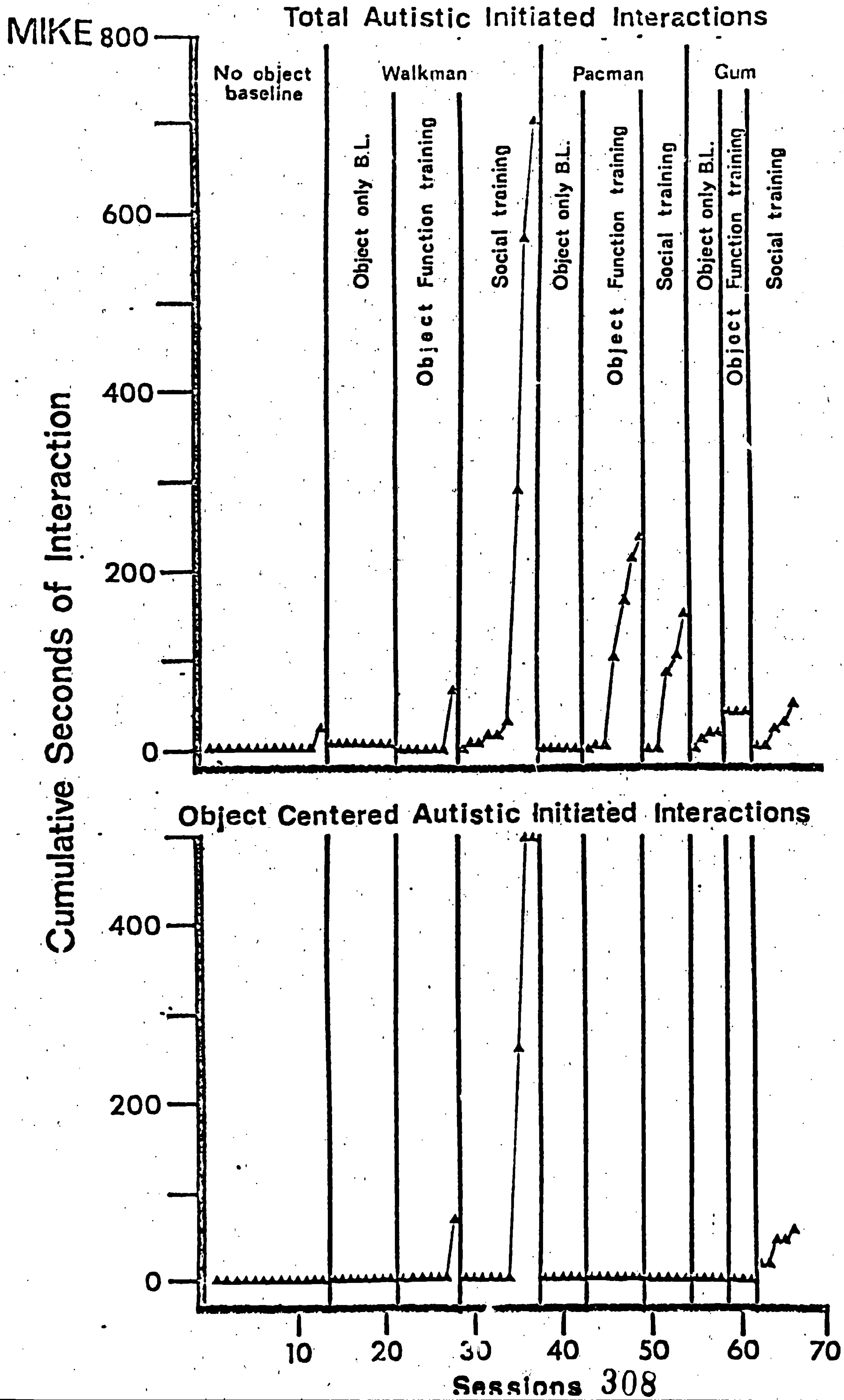
Dan
Baseline
Social Skill Training
Percentage of Correct Responses
PacMan
Walkman
Gum
100
75
50
25
0
5
10
15
20
25
30
35
Sessions
□ ~ Retention (unprompted, nonreinforced probe)
● ~ Training

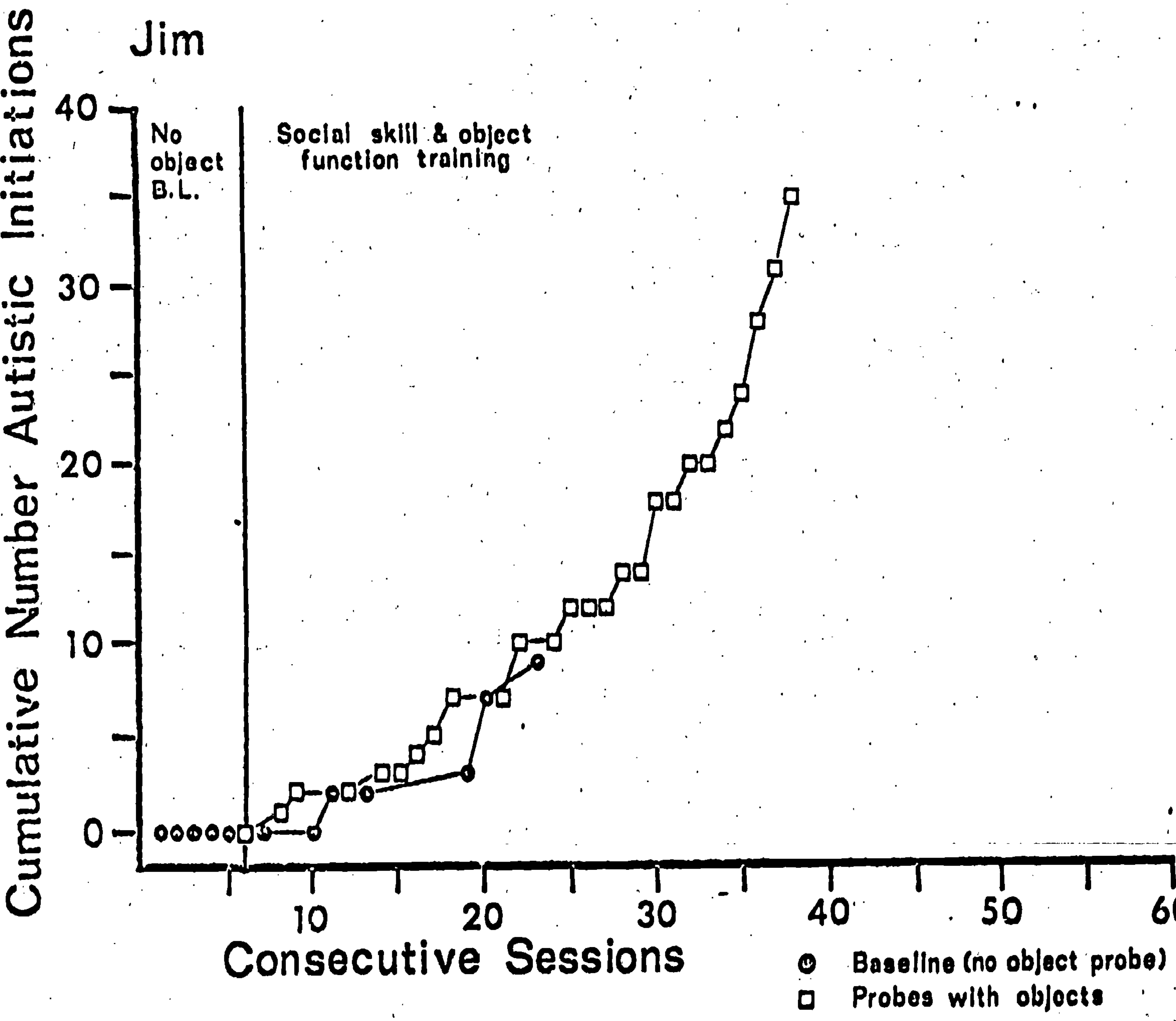


Dan
o-o ~ No object baseline
x-x ~ Object baseline
O-O ~ Function of object training
△-▲ ~ Social Skill Training: Time 1
□-□ ~ Social Skill Training: Time 2
Mike
Cumulative Number Autistic Initiations
Consecutive Sessions
0
10
20
30
40
50
60

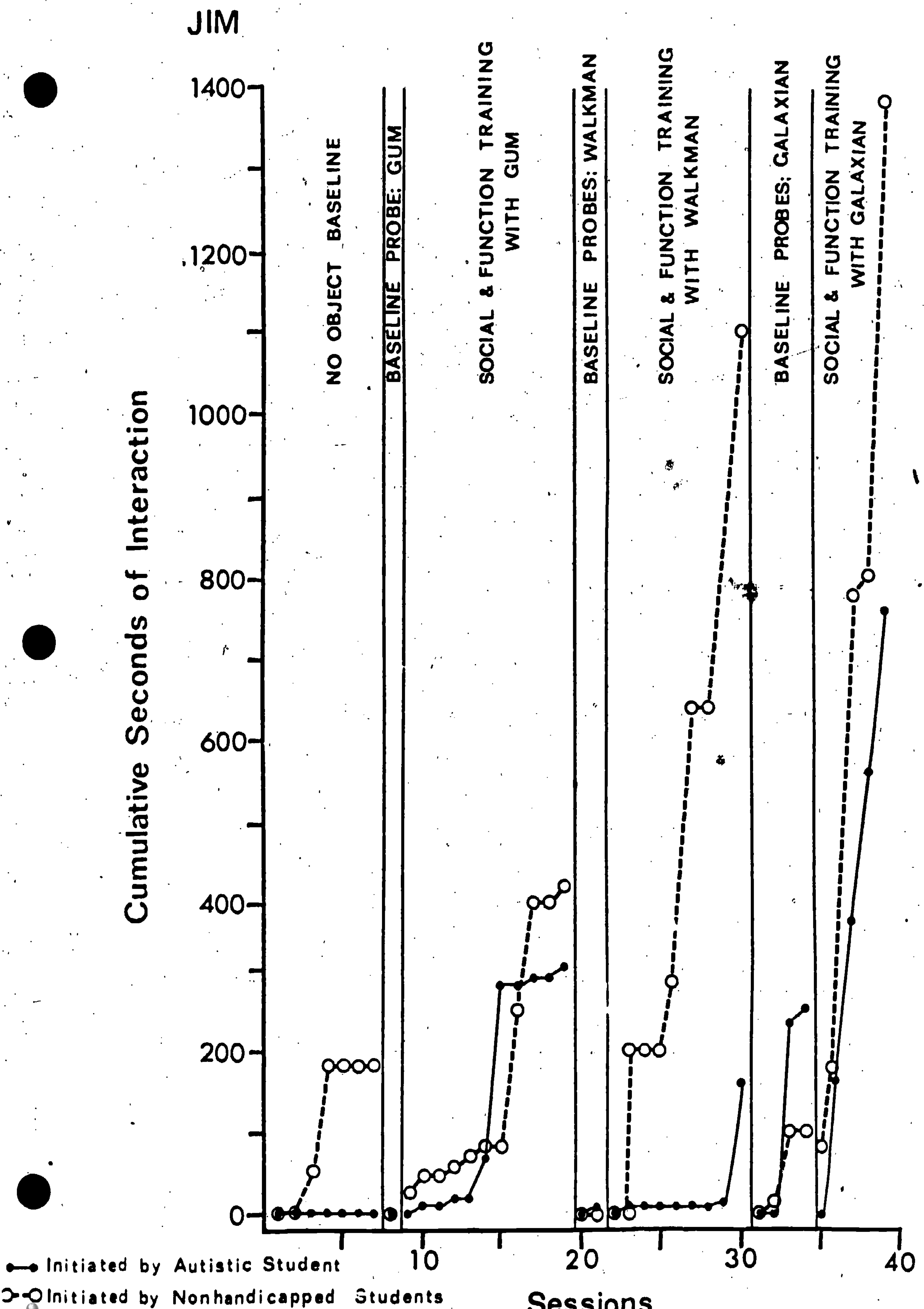
DAN


1400
1200
1000
800
600
400
200
0
Cumulative Seconds of Interaction
No object baseline
Pacman
Walkman
Gum
Object only B.L.
Object Function training
Social training
Object only B.L.
Object Function training
Social training
Object only B.L.
Object Function training
Social training
1
20
30
40
50
60
70
Sessions


MIKE
Total Autistic Initiated Interactions
No object baseline
Walkman
Pacman
Gum
Object only B.L.
Object Function training
Social training
Object only B.L.
Object Function training
Social training
Object only B.L.
Object Function training
Social training
Object Centered Autistic Initiated Interactions
Cumulative Seconds of Interaction
800
600
400
200
0
400
200
0
10
20
30
40
50
60
70
Sessions



Jim
Cumulative Number Autistic Initiations
40
30
20
10
0
No object B.L.
Social skill & object function training
10
20
30
40
50
60
Consecutive Sessions
Baseline (no object probe)
Probes with objects



JIM
1400
1200
1000
800
600
400
200
0
Cumulative Seconds of Interaction
NO OBJECT BASELINE
BASELINE PROBE: GUM
SOCIAL & FUNCTION TRAINING WITH GUM
BASELINE PROBES: WALKMAN
SOCIAL & FUNCTION TRAINING WITH WALKMAN
BASELINE PROBES; GALAXIAN
SOCIAL & FUNCTION TRAINING WITH GALAXIAN
10
20
30
40
Initiated by Autistic Student
Initiated by Nonhandicapped Students
Sessions

A Procedure to Teach Students with Severe Handicaps

to Self-Deliver Reinforcement *

Thomas Haring

University of California, Santa Barbara

Catherine Breen

San Francisco State University

Valerie Pitts-Conway

Marin County Office of Education

Robert Gaylord-Ross

San Francisco State University

Running Head: Teaching Self-Delivered Reinforcement

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Abstract

Three severely handicapped students were taught to self-deliver reinforcement after a teacher had given feedback concerning the rate of production. The students self-managed their reinforcement by use of a prosthetic to determine whether or not to give themselves reinforcement. The performance across seven tasks was evaluated during baseline, a condition of teacher-delivery of reinforcement and progressively thinner schedules of student-delivery of reinforcement. Results showed a steady improvement in performance over time, but comparisons between the conditions of teacher-versus student-control of reinforcement were not possible due to a strong practice effect. Potential future benefits of developing self-management strategies are discussed.

A Procedure to Teach Students with Severe Handicaps to Self-Deliver Reinforcement

Interventions based on self-control of selecting reinforcers, monitoring of performance, selection of standards for performance, and delivery of reinforcement have been shown to be effective over a wide variety of behaviors with non-handicapped and mildly handicapped people (Ballard & Glynn, 1975; Bandura & Perloff, 1967; Dickerson & Creedon, 1981; Felixbrod & O'Leary, 1973; Gallant, Sargent, & Van Houton, 1980; Glynn, 1970; Lovitt & Curtis, 1969). While it appears that procedures based on self-management techniques are frequently equivalent in effectiveness to externally controlled interventions, interest in developing procedures based on self-management is rapidly growing. The self-management of intervention is preferred over more traditional approaches because there is less reliance on service providers. Because the clients themselves have control over the intervention, self-management procedures are believed to produce more meaningful and durable behavior change. Importantly, self-management techniques are increasingly becoming the interventions of choice for nonhandicapped people who desire to change their behavior. Thus, procedures to teach severely handicapped people to self-manage their own interventions would be desirable because self-management procedures are more normalized than are procedures based on external control. Within integrated school sites, self-management procedures may have the additional advantage of creating an image of SH students who are capable of independently managing their own performance in contrast to an image of severely handicapped students as requiring direct teacher control on a continuous basis.

Research concerning self-management procedures with severely handicapped students has only recently been initiated (for a review, see Jackson & Boag, 1981). Within the mental retardation literature, several recent studies have targeted self-management variables including setting standards of performance (Snow, Mercatoris, Beal & Weber, 1982), self-prompting or cueing of behavior (Peters & Davies, 1981), and self-management of token economies (Shapiro, McGonigle & Ollendict, 1980). The studies conducted to date have found that self-management techniques are effective with mentally retarded students; however, the bulk of the studies conducted have been with students who fall within the mild to moderate range of handicaps and the experimental contexts have been of a clinical nature rather than contexts naturally occurring in classrooms for SH learners.

The major purposes of the present investigation are: (a) to test a procedure designed to teach severely handicapped students to self-deliver reinforcement after specified amounts of work have been completed, and (b) to investigate the effects of progressively thinner schedules of reinforcement on the performance of functional tasks. While studies have shown beneficial effects of relatively thin and variable schedules of reinforcement with handicapped pupils (Van Houton & Nau, 1980), there have been few demonstrations of variable schedules of reinforcement with severely handicapped students. Finally, the students who participated in the study were leaving the public school program within the next year. The next most probable environment for the students was a sheltered workshop setting. Observations of worker behavior indicated that reinforcement (usually verbal) and feedback were given to clients on a much less regular basis and at considerably wider intervals than in the school environment. Thus, the ultimate purpose of the study was to prepare the students to function on tasks for ten to fifteen minutes without tangible reinforcement or pacing prompts from service providers.

Method

Participants

Three male students participated in the study. Jack could independently perform most basic self help behaviors such as grooming and dressing. He displayed low rates of performance during most tasks and required frequent pacing prompts to stay on task rather than engage in self-stimulatory behavior. Jack used a system of cards with written statements to communicate his needs and initiate social interactions. Gary was capable of many self help skills such as dressing and preparing simple meals. He frequently perseverated on nonsense syllables resulting in a termination of work. He used signs to communicate, which typically consisted of one sign to label or request items. Earl had mastered most self help skills such as dressing. He was still receiving instruction in the preparation of simple meals, shopping skills, payment strategies, and bus riding. He was capable of producing full sentences, although the content of his utterances was usually bizarre and repetitive. Receptively, Earl could carry out two-step commands. Descriptive data of the participants are given in table 1.

Insert table 1 about here

Setting

The participants attended school on a regular public high school campus located in a middle class suburb. Experimental sessions were held in the participants' special education classroom during regular instructional times. The classroom was divided by partitions into several smaller sub-environments. Each sub-environment was designed to accurately simulate typical sub-environments which may be encountered in non-school settings. Thus, the classroom contained a kitchen area with a stove, sink, refrigerator, and a dining table; a vocational area with production tables and tasks selected from local workshops; and a leisure area containing a sofa, record player, and various games and hobby activities. Experimental sessions were conducted in the subenvironments most appropriate for a given task.

Materials and Tasks

Tasks were selected from the students' IEPs so that the tasks used in the investigation would receive support in the school and home settings of the students. All of the tasks in the study were trained prior to the initiation of the experimental intervention. That is, the participants were already competent with the experimental tasks, although they required frequent prompts and verbal feedback to maintain performance at criterion levels. All materials used in the investigation were either typical domestic items such as silverwear, clothing, or hobby activities or vocational training materials available in hardware stores. A summary of the tasks and materials used in the investigation is given in table 2.

Insert table 2 about here

Experimental Procedures

Baseline. The teacher began the session by verbally cueing the student to do a task. If necessary, prompts were given to sit down and pick up the appropriate materials. Thereafter, the teacher delivered no prompts, feedback or reinforcement.

Self-managed reinforcement. The students were trained to self-manage their reinforcement with the use of a 1 x 1 cm cube to cue the delivery or non-delivery of reinforcement. The cube was made by modifying a standard die by painting its sides either red or white. Immediately after 5 minutes of work, the students were cued to roll the cube. If, a red side was obtained, the participant was to self-deliver a reinforcer; a white side signaled the participant to return to work. By altering the ratio of red to white sides, a variety of variable schedules of reinforcement could be managed by the student.

The students were taught to self-manage their reinforcement using a standard correction procedure (see table 3). After working on task for five min, the teacher determined if the student had met a pre-set criterion of 20% more units of work (i.e. units assembled, table settings completed, pieces of yarn hooked, T shirts folded, or dishes washed). If the student had met the criterion, the teacher prompted the self-management responses by saying, "good fast working". If after the specified latency the student did not independently initiate a response, the student first received a gestural prompt and failing that, a manually guided prompt to complete a response. If after a 5 min work period the student did not meet the criterion, the teacher said, "you need to work faster". Sessions consisted of two 5 min work periods on the same task.

Insert table 3 about here

Reinforcers. Gary was taught to take sections of fruit for reinforcement; Jack took pieces of a Tyco brand HO model gas station; and Earl took chocolate kisses. If a participant earned an item, he would take a break (usually for 10 to 15 sec) and eat the consumable reinforcer. Jack would put the pieces of the gas station into the model box to assemble later. The use of edible reinforcement was considered appropriate within the context of this study because the participants ate food over which they themselves maintained control. In terms of normalization, eating food during breaks within classrooms was a completely normal aspect of life at this high school. It should be noted, however, that eating food that was handed out by a teacher would have been potentially stigmatizing. Thus, the present reinforcement procedure was designed to appear as typical of non-handicapped behavior as possible and at the same time occur rapidly so as not to pull the student off-task for long durations of time. The same reinforcers were used during the teacher-managed reinforcement condition.

Teacher-managed reinforcement. As during the self-managed condition, the student worked for 5 min periods. If the student met the production criterion, the teacher said, "good fast working" and consulted a table of random numbers to determine if a student was to receive tangible reinforcement. The rate of reinforcement was yoked to that which the student received during the self-managed condition. As during the self-managed condition, the student was also offered the cube to roll to control for the possible reinforcing effects of manipulating the cube; however, during the teacher-managed condition the results of the roll had no bearing on obtaining a reinforcer.

Reinforcers were consumed in the same manner described earlier.

Experimental Design

Gary and Jack. A multiple baseline design across three behaviors was employed to assess the effects of teacher and student-managed reinforcement on the number of units of work completed. After stable baselines were achieved for the three behaviors, one behavior was selected for intervention. When a reliable change in the frequency of the first behavior was obtained, the same treatment was used to sequentially alter the frequency of the two remaining behaviors. The order of the treatments (i.e. student-managed vs. teacher-managed) was staggered across the two students to assess possible order effects.

Earl. A reversal design was employed with the order of treatments being ABACAC. A represents baseline; B, teacher-managed reinforcement; and C, student-managed reinforcement.

Measurement and Interobserver Agreement

Three types of dependent variables were measured. The productivity of the students was assessed by counting the number of units correctly completed during each trial. The number of prompts required for completion of self-managed responses was recorded. Finally, an assessment was made of the level of attentive behaviors toward the teacher, other students in the classroom and the reinforcers. The student's interest in receiving tangible reinforcement and attention to people was probed immediately before and after each roll of the cube. Attentiveness to the teacher was defined as making eye contact, verbalizing, or changes in the student's orientation of his head towards a peer or teacher. Interest in the reinforcement or the reinforcement procedure was defined as smiling or changes in posture to indicate interest or excitement. The scores were aggregated across the two response classes to give a general index of student interest and responsiveness as a function of the reinforcement procedure. The aggregate score was produced by assigning a score of +1 if a change indicating increased interest occurred, a +1 if the student increased attentiveness to people, a +1 if the student started to smile after a roll, and a score of -1 if the student stopped smiling after a roll. Thus, for any given trial a range of aggregate scores from -1 to +3 was possible.

In approximately 20% of all sessions both performance and attentiveness data were scored independently by two observers. The second observer (the first author) also watched the trainer (the second author) to note any deviations from the experimental procedures and provided feedback to ensure the consistency of the independent variable throughout the study. A percentage of agreement coefficient was calculated for each reliability session. The agreement for the performance data was calculated as such:

$$\text{interobserver agreement} = \frac{\text{Smaller \# of units counted by trainer or observer}}{\text{Larger \# of units counted by trainer or observer}} \times 100$$

Eight reliability sessions were conducted for Jack and Gary, and five were conducted for Earl. One hundred percent agreement was achieved during all 21 reliability sessions.

The agreement calculation for the attentiveness data did not include instances of the joint agreement on the absence of an attentiveness response: Interobserver agreement =

$$\frac{(\text{\# of agreements that a response occurred})}{(\text{\# of agreements}) + (\text{\# of disagreements})} \times 100$$

The interobserver agreement data for Jack ranged between 86% and 100% with an average of 88%. The interobserver agreement for Gary's data had a range of 50% to 100% and an average of 92%. The interobserver agreement for Earl's data was 100% on all five occasions. The lower reliability of the attentiveness data may have reflected the more rapid changes of those behaviors than is typically assessed in behavior analytic research. Earl's data showed consistent agreement on these responses because Earl was rarely responsive along these behavioral dimensions.

Results

Acquisition of Self-Managed Skills

The data for acquisition of the cube-rolling responses and the self-delivery of reinforcers indicated that the students could independently manage the procedure with five sessions of instruction. Soon after acquiring the cube-rolling and self-reinforcing responses, Gary attempted to alter the outcome by turning the cube to a red side following an unsuccessful roll. This occurred approximately one out of every four unsuccessful rolls throughout the duration of the study. Jack and Earl consistently and independently complied with the outcome of the roll and as a result, the teacher was able to let them independently manage and deliver their own reinforcers. Gary, in contrast, required continued supervision by the teacher.

<u>Task Performance</u>

The number of units completed during each session by Jack are represented in Figure 1. Jack's data have been selected for presentation because they are typical of the data collected for the three participants; however, Jack's data are the most complete because the study had to be terminated due to summer vacation. Data for Gary was proceded as far as Baseline, Student VR-2, Teacher VR-2, Student VR-2 and Student VR-3. Earl's data contrasted Baselines, Student VR-2, and Teacher VR-2 within a reversal design.

Insert figure 1 about here

Jack's data (figure 1) show that stable baselines were achieved across the three experimental tasks. Intervention with teacher control of reinforcement on a VR-2 schedule produced a noticeable increase in the level of performance from the baseline levels. Some upward trend or drift was present in the data from the folding and rug hooking tasks, but drift was not apparent with the packaging task. When student control over the VR-2 was introduced, the upward trend continued with the folding and rug hooking task. In addition an upward trend was produced upon introduction of the Student VR-2 with the packaging task.

Jack's data indicates a strong practice effect as evidenced by the continued upward trend throughout the data; therefore, it is not possible to conclude that either student or teacher control of reinforcement produces superior performance. The conclusion that student control over reinforcement is at least as effective as teacher control is possible since Gary's data, which counterbalanced the order of introduction of the treatments, also showed the same degree of upward trend throughout the data set.

Within Jack and Gary's data the strong upward trend was also evident as the progressively thinner schedules of reinforcement were introduced. Thus, conclusions that thinner schedules produced superior performance are not warranted. A summary of the data aggregated across the three participants is given in Figure 2. The performance steadily improved throughout the study for the three participants. A one month follow-up of Jack's data indicated that the improvement in performance continued to be maintained at high levels without any pacing prompts or reinforcement.

Insert figure 2 about here

<u>Collateral Behavior Change</u>

The degree of collateral behavior change of the attentiveness responses is depicted in table 4. The data indicates that the three participants received higher scores when the roll of the cube generated reinforcement. Most frequently, the students smiled and showed positive affect following a favorable roll. When the roll was not successful, responses indicating positive affect, interest in the reinforcers, or interest in others were unlikely. There was an intermediate level of responding for the participants during the teacher-managed reinforcement phase. During the teacher-managed reinforcement phase, the roll of the cube had no relationship to the attainment of reinforcement, because the reinforcer was delivered prior to the cube roll. Since reinforcement was delivered regardless of the outcome of the roll, the data from the teacher-control phase serves as a neutral baseline to judge the influence of the cube during the student-managed phase on the collateral responses. Thus, compared to the data when the roll of the cube was meaningless, a positive or negative outcome during the student-managed reinforcement condition differentially affected the collateral behaviors toward people and the reinforcers.

Insert table 4 about here

Discussion

The study showed that three severely handicapped students could acquire the skills necessary for self-management of reinforcement. Jack and Earl consistently managed their own reinforcement throughout the study. Gary required continued surveillance by the teacher to insure compliance with the outcome of the roll. Although the procedure is probably susceptible to individual differences, because the self-management skills were rapidly acquired, the cost (in training time) of trying the procedure is minimal.

The self-management of reinforcement was as effective as teacher delivery of reinforcement in the traditional manner. The procedure may prove to be advantageous because powerful reinforcers could be used without the stigmatizing effects associated with the "M&M syndrome". The procedure may also prove useful if it results in greater efficiency of teacher time. In the present study a minimal amount of teacher time was saved, because the teacher still counted the students work and prompted the student by saying, "good fast working". However, more time could be saved with the use of jigs or outlines of units on which students would place completed units and then self-deliver reinforcement when the outlines or jig positions were filled.

The use of the cube led to a natural and systematic randomization process. The cube also led to a simple procedure for thinning reinforcement. Because of the strong practice effect for the three participants, statements about improved levels of performance under thin schedules are premature; however, a steadily improving level of production across tasks and participants was observed as the study progressed. Jack's data is particularly impressive in that during the student-management of reinforcement on the VR-6 schedule, Jack received tangible reinforcement on the average after every half hour of work and the high level of productivity that developed during the study was maintained in the absence of pacing prompts or tangible reinforcement.

Little is known about the interaction between attention or affective responses and the motivation to perform tasks by people with severe handicaps. The present study demonstrated that three severely handicapped students responded with a consistent pattern of such collateral behaviors in response to the experimental conditions. That is, responses which may be indicative of increased interest and positive affect appeared most frequently after a positive roll of the cube. These results support the study by Dunlap and Koegel (1980) which found increases in similar collateral behaviors when task variation was used as a motivational technique. In the present study, the differential responding provided evidence that the participants did in fact discriminate the consequences of the procedure.

The self-management of behavior is a complex process entailing the formation of standards of performance, the evaluation of performance, and the delivery of reinforcement (Bandura, 1971,1976,1977). The present study dealt with only one component of the self-management process. Procedures incorporating additional components of the self-management process have yet to be developed for students with severe handicaps. Future research should investigate whether additional self-management behaviors can be taught to severely handicapped people. Ultimately, the development of self-management procedures may lead to a reduction in the classic problem of finding motivating effects that are naturally occurring in environments for routine and mundane tasks for which nonhandicapped people frequently create artificial reinforcers for themselves to maintain performance.

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Table 1

Descriptive Data

Participant	Age	Handicapping condition	I.Q. estimated	Source
Jack	18 yrs.	Autism	50	Leiter
Gary	20 yrs.	Severe Mental Retardation Autistic-like Behaviors	No scores available	
Earl	18 yrs.	Autism	46	WISC-R Verbal Subscale

Table 2

Descriptions of Tasks

Participant	Title and description of task	Location
Jack, Gary and Earl	Packaging a faucet repair kit Task description: Five bins of plastic washers and screws were located .3m in front of student. The student matched parts to an outline of parts taped to the table. When the outlines were covered the student placed the items into a box and stacked the box. Materials: ESCO brand faucet repair kit.	Vocational area
Jack	Rug hooking Task description: A commercially available rug hooking kit was used. The kit contained a rug hook, pieces of yarn and a cloth grid on which to hook the yarn. The student had to match the color of the yarn to the color of the grid. After matching the color, the student hooked the yarn into the grid using the rug hook. Materials: 2' x 2' Sunset Scene rug hooking kit.	Leisure area
Jack	Folding clothes Task description: Task consisted of folding t-shirts from a laundry basket. T-shirts were placed face down on a table. One arm at a time was picked up and folded over the back of the shirt. The shirt was then folded in the middle and stacked on the table. Materials: 30 t-shirts, laundry basket, table.	Kitchen area
Gary	Dishwashing Task description: Task began after lunch with dirty dishes piled into a plastic tub in the sink. Items were picked up, one at a time, washed in another plastic tub filled with soapy water, rinsed under the faucet and finally placed on a drying rack. Materials: Dirty dishes, sink, 2 plastic tubs, drying rack.	Kitchen area

Table 2 (continued)

Participant	Title and description of task	Location
Gary	Table setting Task description: The task was conducted before lunch. The student set eight place settings consisting of a plate, glass, knife, fork and spoon and a napkin. Materials: Sufficient silverware, napkins, dining-ware and kitchen table.	Kitchen area

Table 3

Instructional Procedures for Teaching Self Management of Reinforcement

Task analysis	Procedure
1. Work on task for five minutes. 2. Pick-up cube. 3. Roll cube. 4. If red side is obtained; pick up reinforcer and consume. 5. If white side is obtained, return to work.	After 5 minutes of work, the teacher counts the number of units or work completed. If the number of units completed is at least 20% greater than baseline, the teacher says, "good fast working" to cue the self-reinforcement responses. If after a 3 sec latency a student hasn't started a given response, the response is prompted by a a gesture. If the student does not initiate this response within 2 sec after a gesture the response is manually guided. If after 5 minutes of work the student did not work 25% faster than baseline, the teacher says, "You need to work faster" and prompts the student (if necessary) to resume work.

Table 4

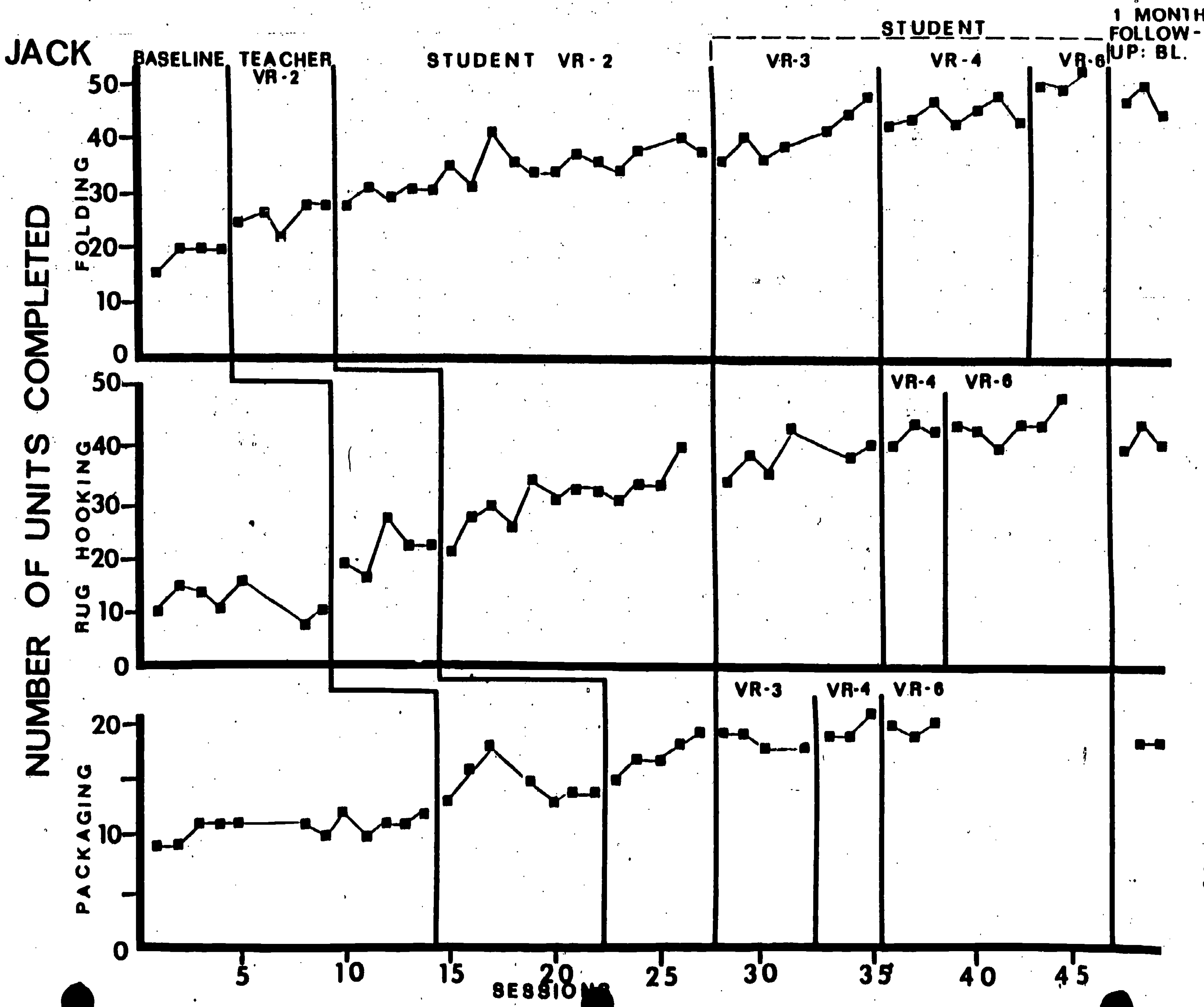
Mean Attentiveness Scores Per Trial Under Each Condition

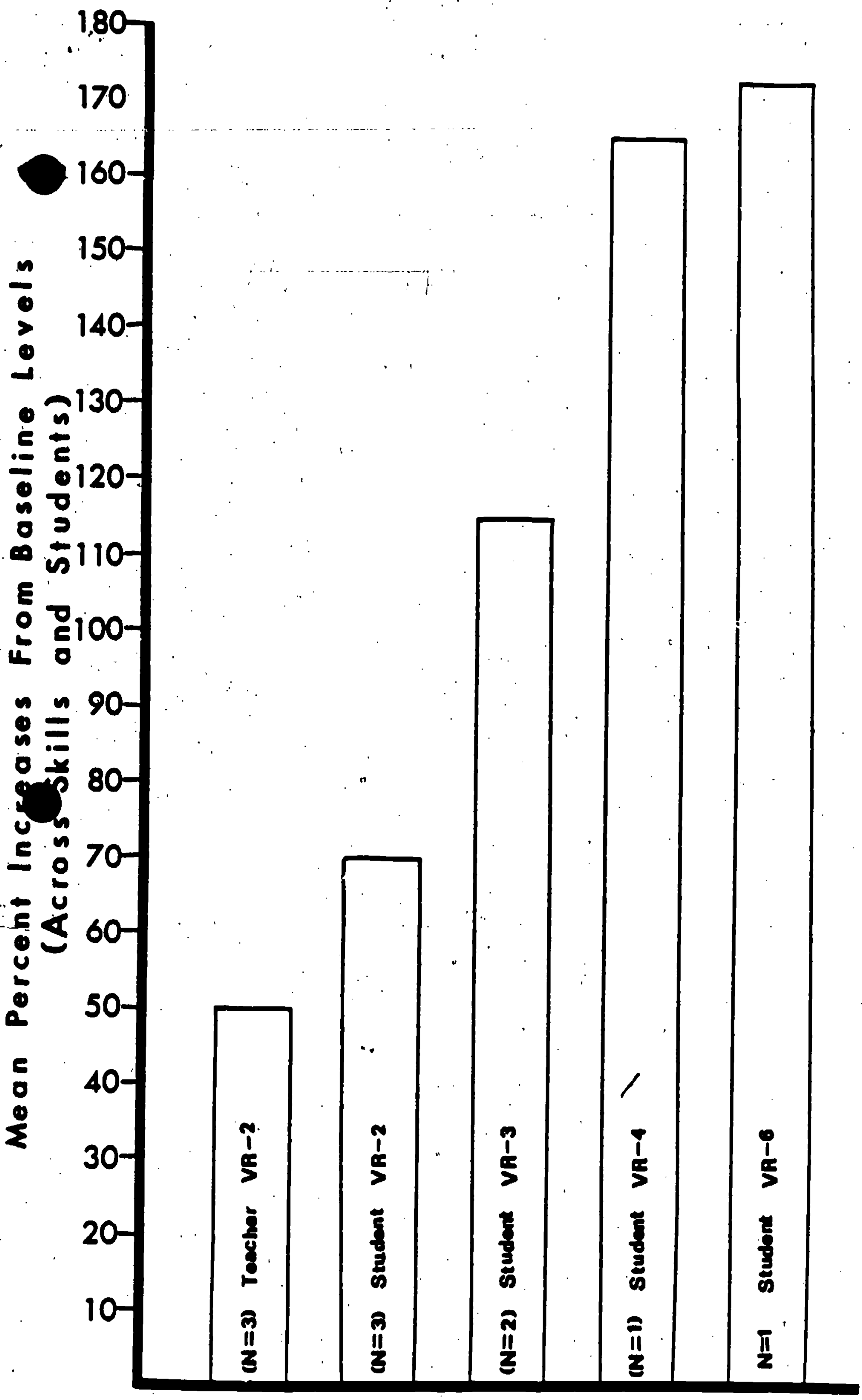
Experimental phase	Outcome	Mean score per trial		
		Jack	Gary	Earl
Self-generated reinforcement	+	.90	.50	.33
	-	.44	-.33	-.20
Teacher-generated reinforcement	non-contingent	.50	.16	0

Figure Captions

Figure 1. Number of units completed by Jack across three tasks and seven experimental conditions.

Figure 2. Mean percent increases from baseline levels in five experimental conditions. (Data is aggregated across seven tasks and three students. The "N" in each bar indicates the number of students represented in the bar.)


JACK
BASELINE
TEACHER VR-2
STUDENT VR-2
STUDENT
VR-3
VR-4
VR-6
1 MONTH FOLLOW-UP: BL.
NUMBER OF UNITS COMPLETED
FOLDING
RUG HOOKING
PACKAGING
SESSIONS
0
10
20
30
40
50
5
15
25
35
45


Mean Percent Increases From Baseline Levels
(Across Skills and Students)
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
(N=3) Teacher VR-2
(N=3) Student VR-2
(N=2) Student VR-3
(N=1) Student VR-4
N=1 Student VR-6